Daharki

ISBN

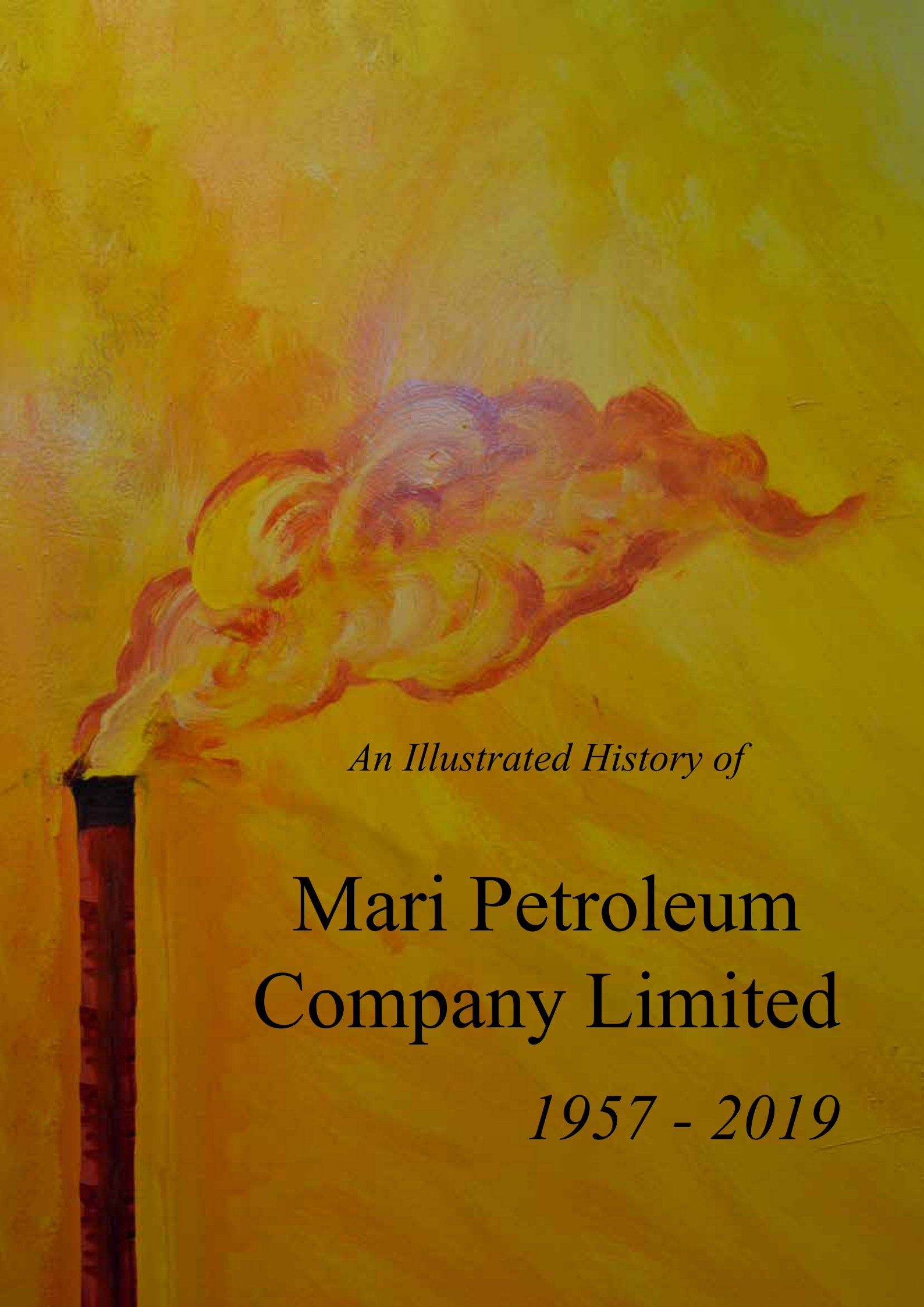
First Edition 2019, 1000 Copies

Publisher. War Studies, 350 Askari 2, Rahwali Cantonment, Gujranwala, Pakistan

Printer: The Army Press; Plot 1, Street 40, I&T Center, Islamabad. 44000
Telephone: +92-51-2351135-37, Email: thearmypress786@hotmail.com

Price: PKR 3000/-
US: 30.00 $

Author: Major (Retired) Aamir Mushtaq Cheema
Email: aamircheema@outlook.com



An Illustrated History of

Mari Petroleum Company Limited

1957 - 2019

September 1954. Pak-Stanvac Petroleum Project

July 1957. Mari X-1 Habib Rahi lime stone

December 1964. ESSO to built Fertilizer plant at Daharki largest in the World

December 1966 - 69. Mari Gas Field Expansion, Ten gas wells completed

1967. Reservoir study of Habib Rahi conducted by Core Labs (USA)

December 1968. Engro Fertilizer Plant commissioned

1977 - 78. Phase II development of Mari Gas field
Pak Saudi Fertilizers plant at Mirpur Mathello

May 1981. Phase III development of Mari Gas field
Stanvac merged in ESSO
Fauji Fertilizer plant at Goth Matchi

1982. Reservoir study of Habib Rahi conducted; Core Labs (USA)

4 December 1984. Mari Gas Company Limited; formed having 21 gas producing wells in an area of 943 square kilometres with an output of 200 mmscf/daily. Major General (R) Mahmood Aslam Hayat as MD

October 1985. Phase IV of Mari Gas field. 27 wells drilled

1988. Reservoir study of Habib Rahi conducted by Peterism (USA)

1992. 5th Development Phase of Mari Gas field. New gas gathering system constructed.
Lieutenant General (R) Hamid Niaz as New MD

16 June 1994. Mari Gas Company limited shares being listed and traded on Karachi Stock Exchange

22 December 1996. Head office Building at Islamabad Inaugurated

1st January 1997. Exploring deeper-Goru B

2001. Mari allowed to expend 20 million US $ on exploration by Government of Pakistan.
Mari raised an exploration department
Phase VI development of Habib Rahi reservoir

13 June 2003. 100th well drilled in Mari Gas Field

2005. Mari ventures outside, it acquires license of Karak, Noor, Bolan Blocks alongwith Pasni and Makran offshore. Gas discovery in Ziarat Block.
Gas discovery in Sui main limestone and Pirkoh limestone formation

2007. Purchase of Rig 1500HP from China. Gas Discovery at Sui upper limestone (Bhitai I).

2008. Oil discovery in Baluchistan, Ziarat Block (Khost-II)

2010. Gas condensate discovery in Sujawal Block (Sujawal-I). Oil discovery in Karak Block (Halini)

12 November 2012. Mari Petroleum Company Limited raise
New Head Office Building Inaugurated

2013. Mari Seismic Unit raised

August 2014. Supply of Gas to Quetta from Zarghun
Rig Mari, 2500HP Purchase from China
Oil discovery in Ghauri Block. Raising of Mari Services Division.

18 February 2015. Halini deep Spud in; the deepest well of Mari, 15,961 feet.

22 December 2017. Golden Jubilee of Mari Gas Field.

31 August 2018. Mari Gas Field development Phase-X initiated.

January 2019. General Qamar Bajwa COAS visited Mari Headquarters

Table of Contents

Abbreviation 09

Terminology 10

Petroleum:- Civilization of Living Dead 14

Chapter II - Stanvac and Mari Gas Field 1957-1984 27

Chapter III - Mari Gas Company 1984 - 2012 42

Chapter IV - Mari Petroleum Company 71

Chapter V - Mari Fields, Wells and Rigs 90

Chapter VI - Mari Culture 149

Managing Directors 204

Mari: A History of History 206

Bibliography 225

Abbreviations - Mari

bbl	Barrel
bopd	Barrel of oil per day
BP	British Petroleum
bcfd	Billion cubic feet day
Btu	British thermal unit
Cft	Cubic Feet
CSR	Corporate Social Responsibility
D&PL	Development and Production Lease
DST	Drill stem test
ESSO	Eastern States Standard Oil
HSE	Health Safety Environment
HRL	Habib Rahi Limestone
JV	Joint Venture
MSD	Mari Services Division
MSU	Mari Seismic Unit
MDU	Mari Drilling Unit
MD	Managing Director
MMscf	Million standard cubic feet
Mscf	Thousand standard cubic feet
MGCL	Mari Gas Company Limited
MPCL	Mari Petroleum Company Limited
OGDCL	Oil and Gas Development Corporation Limited
PKL	Pir Koh Limestone
POL	Pakistan Oil Limited
PPEPCA	Pakistan Petroleum Exploration and Production Companies Association
Rs	Rupees (Pakistan)
Retd	Retired
SML	Sui Main Limestone
SUL	Sui Upper Limestone
Stanvac	Standard Vacuum Oil Company
TRCF	Total Recordable Case Frequency
Tcf	Trillion cubic feet
US$	United States Dollar
UTP	Union Texas Pakistan

Oil & Gas Terminology

Abandon. To cease work on a well which is non productive, a well is then plug off with cement.

Barrel – The basic unit for measuring oil. A barrel is equal to 42 U.S. gallons. Quantities of natural gas and natural gas liquids translated into barrels of oil based on equal energy content. The energy content of six thousand cubic feet of gas (6 MCF) is the rough equivalent of one barrel of oil. One barrel of oil = 35 Imperial gallons or 159 litres ; 7.5 barrels = 1 tonne or 6.29 barrels = 1 cubic metre. It may be noted that One Imperial gallon = 1.2 US gallon. A rule adopted in 1886 in West Virginia, which set the measure of a barrel as 40 liquid gallons plus 2 more gallons in favour of the buyer. Barrels of Condensate Per Day ("BCPD") - A common unit of measurement for the daily volume of condensate produced by a well. The volume of a barrel is equivalent to 42 U.S.gallons.

Bit. The tool used to crush or cut rock. Everything on a drilling rig directly or indirectly assists the bit in crushing or cutting the rock.

Block. Pakistan is divided into blocks in terms of exploration, these blocks are put up for auction for exploration; often named in terms of locality like Zarghun or Sajawal etc.

Blowout - An uncontrolled flow of reservoir fluids into the borehole, and sometimes catastrophically to the surface. A blowout may consist of saltwater, oil, natural gas or a mixture of these. Blowouts occur in all types of exploration and production operations, not just during drilling operations.

Condensate. Hydrocarbons which are in the gaseous state under reservoir conditions and which become liquid when temperature or pressure is reduced. A mixture of pentanes and higher hydrocarbons.

Coring. Taking rock samples from a well by means of a special tool , a 'core barrel'.

Crude Oil – Liquid petroleum as it comes out of the ground. Crude oil varies radically in its properties, such as specific gravity and viscosity.

Creaming Theory. A statistical technique which recognises that in any exploration province after an initial period in which the largest fields are found, success rates and average field sizes decline as more exploration wells are drilled and knowledge of the area matures.

Drilling. Boring a hole in the earth for the extraction of oil and gas. A method of drilling where the drill bit is turned in a horizontal direction in an effort to produce hydrocarbons from a number of areas located at the same approximate depth. Bit is a drilling tool that cuts the hole. Bits are designed on two basic and different principles. The cable tool bit moves up and down to pulverize. The rotary bit revolves to grind

Downstream – Those activities in the oil and gas industry which take place away from the source of the supply. Downstream operations commonly include refining and marketing endeavours.

Exploration – The search for oil and gas. Exploration operations include aerial surveys, geophysical surveys, geological studies, core testing and the drilling of test (wildcat) wells.

Field. A geographical area under which an oil or gas reservoir lies.

Fault Trap. A structural trap in the earth, favourable for the retention of petroleum, formed by the cracking and breaking of a rock plane.

Fishing Tool. A general term for special mechanical devices used to aid the recovery of equipment lost downhole.

Flare. To burn unwanted natural gas through a pipe or stack.

Gas. Natural Gas is Hydrocarbons, which at atmospheric conditions of temperatures and pressure, are in a gaseous phase. Natural gas becomes a liquid at a temperature of minus 258 degrees F and may be stored and transported in the liquid state. Hydrocarbons found in natural gas which may be extracted or isolated as liquified petroleum gas and natural gasoline are known as Natural gas liquids. Natural gas contaminated with chemical impurities, notably hydrogen sulphide or other sulphur compounds, which cause a foul odour is classified as Sour Gas. Wet Gas is the one which contains liquid hydrocarbons in solution, which may be removed by a reduction of temperature and pressure or by a relatively simple extraction process; on the other hand Dry Gas is also a natural gas but it doesnot contain dissolved liquid hydrocarbons. Casing-head Gas is produced with oil in oil wells and is taken from the well through the casing-head at the top of the well.

Hydrocarbon. A compound containing only the elements hydrogen and carbon. May exist as a solid, a liquid or a gas. The term is mainly used in a catch-all sense for oil, gas and condensate.

Integrated Company – A company involved in virtually all aspects of the oil and gas industry including exploration, production, transportation, refining and marketing. These companies are also referred to as major oil companies.

Joint - A length of pipe, usually referring to drillpipe, casing or tubing

Kelly. A long square or hexagonal steel bar with a hole drilled through the middle for a fluid path.

Kill. To stop a well from flowing (or having the ability to flow) into the hole or wellbore.

Line Heater. Equipment that transfers heat to the produced gas stream. Heaters are especially used when producing natural gas or condensate to avoid the formation of ice and gas hydrates.

Midstream. A term sometimes used to refer to those industry activities that fall between exploration and production (upstream) and refining and marketing (downstream). The term is most often applied to pipeline transportation of crude oil and natural gas.

Mousehole. A shallow borehole under the rig floor, usually lined with pipe, in which joints of drillpipe are temporarily placed.

Natural Gas. A naturally occurring mixture of hydrocarbon gases that is highly compressible and expandable. Methane is the chief constituent of most natural gas (constituting as much as 85% of some natural gases), with lesser amounts of ethane, propane, butane and pentane. Impurities can also be present in large proportions, including carbon dioxide, helium, nitrogen and hydrogen sulfide.

Non-operator. The working interest owner or owners other than the one designated as the operator of a well.

Oil Field. An area which is underlain by one or more reservoirs containing oil. An oil reservoir is a porous and permeable sedimentary rock containing commercial quantities of oil and gas. Three types of reservoirs are encountered including structural traps, stratigraphic traps and

combination traps. Proven Reserves is the oil which is still in the ground, but which has been located and determined to be recoverable. The facility where the characteristics of petroleum or petroleum products are changed is known as refinery.

Petroleum. A generic name for hydrocarbons, including crude oil, natural gas liquids, natural gas and their products.

Pipelines. a tubular arrangement for the transmission of crude oil, refined products, and natural gas from the wellhead, refinery, and storage facility to the customer. Pipeline measures 14 to 42 inches in diameter, but is usually 20 to 36 inches. It is often composed of 40-foot lengths but lengths may be as long as 60 or 80 feet. The pipe is wrapped and coated for protection against corrosion, especially since it runs underground. About half of all gas and oil is moved by pipeline. Gas under sufficient pressure to enter the high-pressure gas lines of a purchaser; gas sufficiently dry so that liquid hydrocarbons - natural gasoline, butane, and other gas liquids usually present in natural gas - will not condense or drop out in the transmission lines.

Quad. A quadrillion of BTU's. This unit of measurement is used in connection with energy consumption. A barrel of crude oil contains 5.8 million BTU's. Natural gas contains about one million BTU's per MCF.

Rig. The structures and equipment used in drilling an oil and gas well including the derrick, engine, engine house and other equipment.

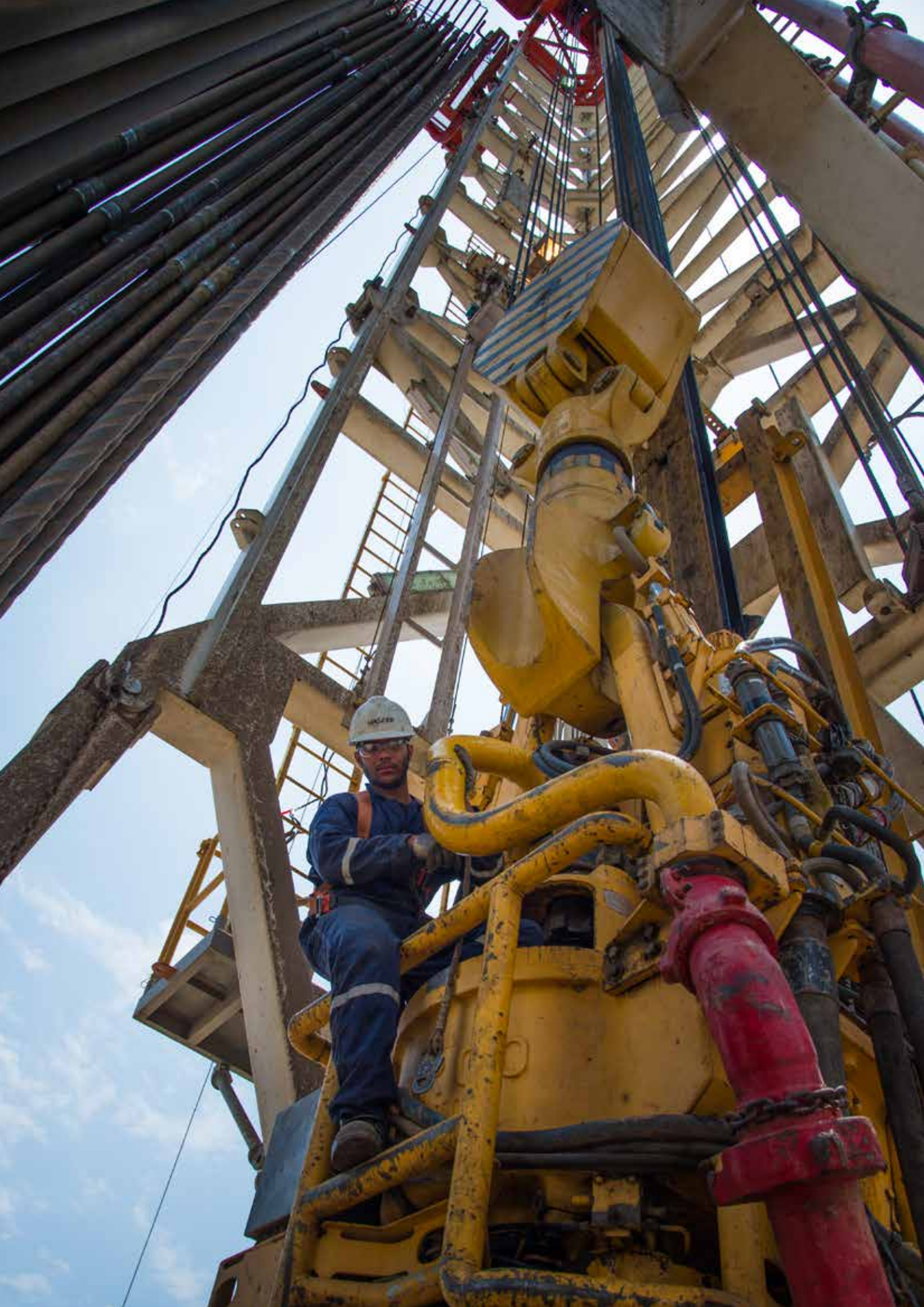
Spudding In. The first boring of the hole in the drilling of an oil well.

Stratigraphy. Branch of geology, deals with the scientific knowledge gain from the study of rock formation. The word stratigraphy comes from the Latin stratum and the Greek graphia, which means the descriptive science of layered rocks.

Sedimentary Basin is defined as Geologically depressed area with thick sediments in the interior and thinner sediments at edges

Upstream. Activities in the oil and gas industry which take place close to the supply. This normally includes exploration and production activities.

Well. A hole drilled in the earth for the purpose of finding or producing crude oil or natural gas or providing services related to the production of crude oil or natural gas. Injection well – A well employed for the introduction into an underground stratum of water or gas under pressure. Injection wells are employed for the disposal of produced water from oil and gas wells. Dry Hole – A completed well which is not productive of oil and/or gas or which is not productive of oil or gas in paying quantities. When an oil well is close down temporarily for repairs, cleaning out, building up reservoir pressure, lack of market, etc. is known as Shut Down. However to cease work on a well which is non-productive, to plug off the well with cement plugs and salvage all recoverable equipment is called Abandon. An appraisal is a well drilled as part of an appraisal drilling programme which is carried out to determine the physical extent, reserves and likely production rate of a field. Wildcat Well is an exploratory well being drilled in unproven territory, that is, in a horizon from which there is no production in the general area. Wellhead. The equipment at the surface of a well used to control the pressure; the point at which the hydrocarbons and water exit the ground.



Petroleum; Tales of Dead & Living

The Indus River and its tributaries-the cradle of civilization houses the relics of one of the oldest civilisation along with the remains of the dead buried beneath us, dating back to millions of years. The tale of the living and dead; one composed of water and the other of Hydrocarbons; the components that comprise of water are living, recorded, empirical, visible, and are part of recorded history whereas those of the dead are composed of hydrocarbons dating back to millions of years.

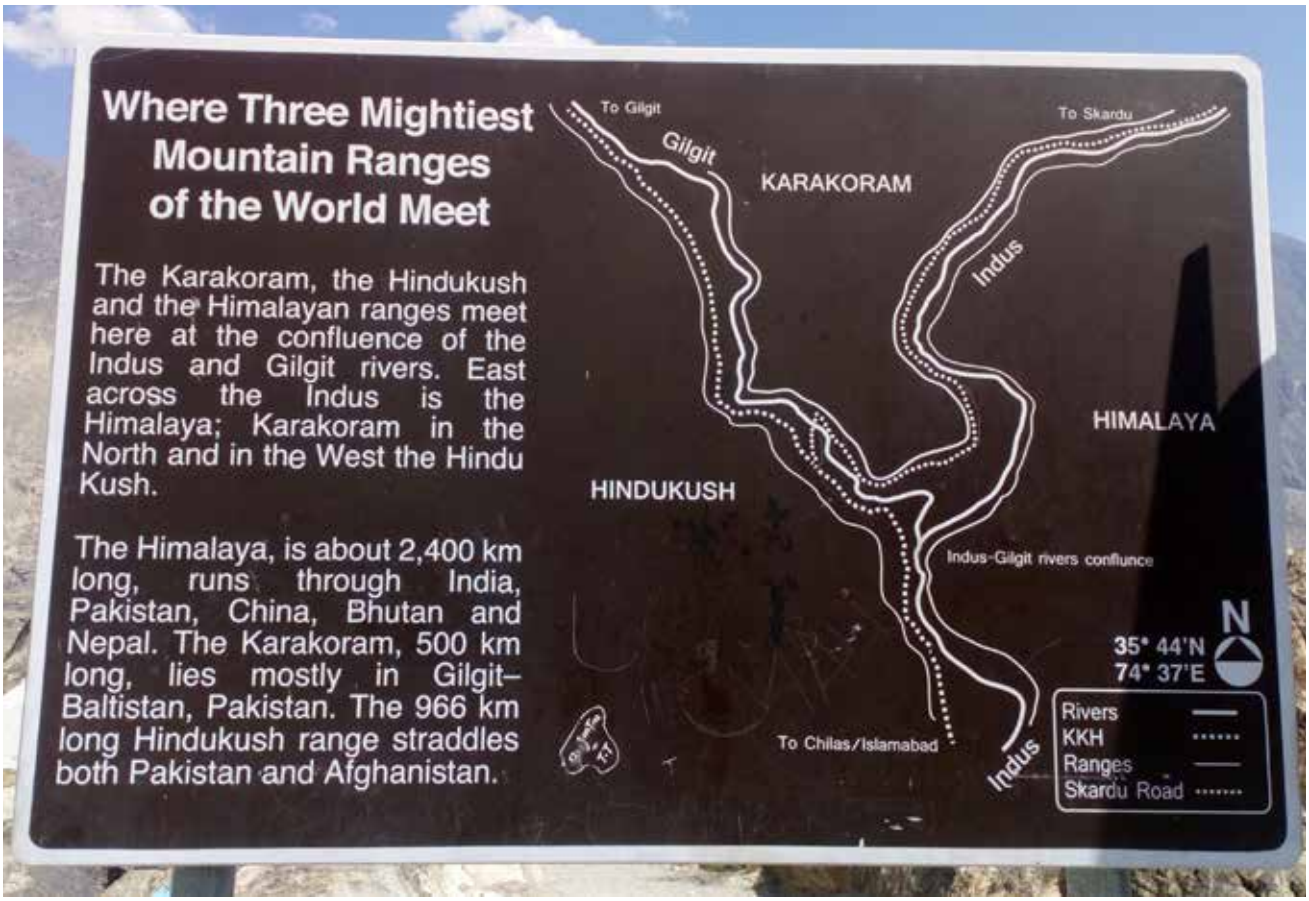
The progress of civilisation is almost entirely dependent upon hydrocarbons as they provide us with much needed fuel for our survival. Pakistan is a unique country in a sense that here civilisation, the living and dead are present. Mohenjo Dharo and Harappa are among the oldest civilisations in the world that took birth along River Indus and its tributaries almost 5000 years ago and their ruins are still present. In Pakistan some of the world's largest reservoir of hydrocarbons has been discovered in the last century and ~~the~~ exploration is still underway. There is a definite connection between both and this makes study of living history and exploration of dead underneath us an interesting phenomenon.

Map of Pakistan

Ancient civilisations knew about the subsurface minerals, including petroleum;[1] a name derived from Latin 'Petra ' and Greek 'leum' thus a liquid or oil from a rock ': however the word came into use in the 15th Century ~~A.D~~ through a German mineralogist George Bauer.[2] The later day archaeological discoveries reveal~~s~~ that civilisations on the banks of the great rivers Euphrates, Tigris, Nile, and Indus were using this rock oil as early as 7000 B.C for: construction of bridges ~~as~~ by Sumerians, mummification by Egyptians and for water proofing of structures by Aryans in Harappa and Mohenjo Dharo. It is a strange coincidence that some of the world's largest petroleum reservoirs have been discovered on the sites of these very ancient civilisations like oil reservoirs in Iraq, Iran, and natural gas reservoirs in Pakistan.[3]

In the medieval era it was believed that the Earth was created on the 26 October 4004 B.C.[4]. Available scientific evidence highlights, our planet is much older than what a normal human mind

1 Brittanica Concise Encyclopaedia ,2006,s.v.''petroleum'' https://www.nationalgeographic.org/encyclopedia/petroleum/
2 http://farlang.com/books/agricola-bandy-de-natura-fossilium George Bauer *De Natura Fossillium*, 1546. Also see Pliny's *Natural History*, 76 A.D. Aristotle *Meteorologica*,300B.C.
3 Rhoada Murphy *A History of Asia 7th edition* (Routledge,2014),pp,2-22.
4 https://www.washingtonpost.com/news/speaking-of-science/wp/2017/03/06/dear-science-how-do-we-know-how-old-the-earth-is/.


Where Three Mightiest Mountain Ranges of the World Meet
The Karakoram, the Hindukush and the Himalayan ranges meet here at the confluence of the Indus and Gilgit rivers. East across the Indus is the Himalaya; Karakoram in the North and in the West the Hindu Kush.
The Himalaya, is about 2,400 km long, runs through India, Pakistan, China, Bhutan and Nepal. The Karakoram, 500 km long, lies mostly in Gilgit–Baltistan, Pakistan. The 966 km long Hindukush range straddles both Pakistan and Afghanistan.
To Gilgit
Gilgit
KARAKORAM
To Skardu
Indus
HIMALAYA
HINDUKUSH
Indus-Gilgit rivers confluence
N
35° 44'N
74° 37'E
To Chilas/Islamabad
Indus
Rivers
KKH
Ranges
Skardu Road

Pakistan;Confluence of Three Mightiest Mountain Ranges

can comprehend or calculate, it dates back to almost four billion years in terms of geologic time[5] with different ages and era's running back to almost 200 million years. The origin of our Earth is still debateable; there are various theories; religious, philosophical, biological and geological. The Earth is as old as one can imagine. [6]

Petroleum is a naturally occurring liquid found in rock formations. It consists of a complex mixture of hydrocarbons of various molecular weights, plus other organic compounds. [7] It is generally accepted that oil is formed mostly from the carbon rich remains of ancient plankton after exposure to heat and pressure in the earth's crust over hundreds of millions of years. Over time, the decayed residue was covered by layers of mud and silt, sinking further down into the Earth's crust and preserved there between hot and pressured layers, gradually transforming into oil reservoirs.[8] In 100B.C, a Roman scholar Marcus Terentius highlighted the disinfectant qualities of petroleum vapour thus Romans were the very first to use petroleum for fumigation. By 10th Century A.D, Arabs were distilling oil, both Cairo and city of Jericho were lit with it. Marco Polo in his travelogue highlights that in Baku

5 "Geologic time." *Encyclopedia Britannica. Encyclopedia Britannica Online Academic Edition*. Encyclopedia Britannica Inc., 2012. Web. 20 Feb. 2012. <http://www.britannica.com/EBchecked/topic/229694/geologic-time

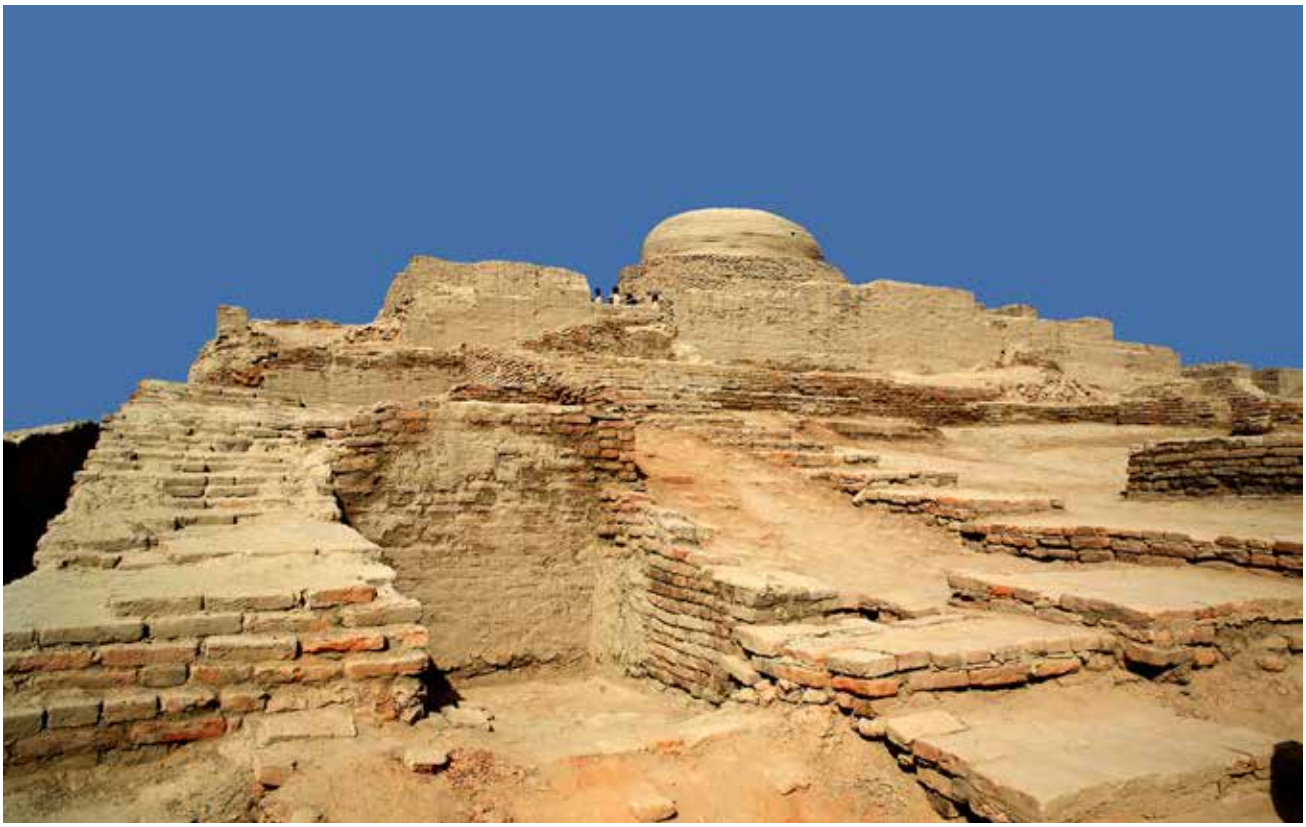
6 Dr Lawrence Badash professor of History of Science at University of California, 'The Age of Earth', *Scientific American, August 1964.*

7 /https://www.britannica.com/topic/list-of-petroleum-products-2069393.

8 Stephen Howrath *A Century in oil The Shell transport and Trading Company 1897-1997* Weidenfeld & Nicholson,London,1997,pp-17-22.

W
DABARKOT 408 km
NAUSHARO (MEHRGARH) 528 km
UR - MESOPOTAMIA 2550 km

Harrapa, 3500 B.C. Punjab



Mohenjo Darro, 3500 B.C. Sindh

'everybody uses oil lamps'.[9] Russian brothers Dubinin had purified kerosene directly from petroleum and the process of refining kerosene from coal was later discovered by Gesner in 1846. Later Ignacyu Kasiewicz improved upon Gesner's method to develop a mean of refining kerosene from the more readily available Rock-Oil or petroleum seepages in 1852. Consequently, the world's very first oil refinery was built in Bodrka near Krosno in 1853. On the American continent, Benjamin Sillimen a Yale professor through experiments was able to fractionate petroleum by distillation. The first modern oil refinery was built in Baku in 1861; at that time Azerbaijan was producing almost 90% of world's oil. A commercially pioneer oil well was drilled in Poland in 1853 followed by another in Romania in 1857. Prominent oil refineries were later on built at Jaslo (Poland) and at Ploiestic (Romania) .

Captain Drake's Drilling site

Modern petroleum exploration and industry took birth with the Captain Drake's oil drilling on 28 August 1859 at Pennsylvania; it is worth mentioning that Captain Drake had received a letter a day earlier from his investors to terminate the much awaited, funded and almost futile project. This by itself set the pattern of ~~even~~ present-day oil industry. Exploration is the key word in this industry, to explore the earth in search of petroleum; at times ~~it~~ this endeavour is successful and at

9 Ismail Nawab, Peter Speers, Paul Hove *Saudi Aramco and its world. Arabia and the Middle East* (Dahran,ARAMCO,1995),176.

times it isn't. Before this day of August, the oil was gathered by digging pits or skimming natural seeping from the surface of streams. Captain Drake had drilled to a depth of almost seventy feet. America being the pioneer in petroleum industry set the benchmark~~,~~ and ~~they~~ introduced the word barrel which is the standard unit for measuring oil, it equals to 42 US gallons. In 1865, the world oil production was 7000 barrels, and 6800 barrels were being drilled in USA. By 1895, this production increased to 2, 84,000 barrels daily and by the end of 1945 it was over seven million barrels daily which increased to over sixty million barrels daily in 1990.[10]

In the last century, oil exploration was limited to ~~the~~ areas known to have oil seepage; later a genetic relationship was established between oil traps and structure, known as anticlines. When this method fails then oil is explored subsurface or stratigraphic traps.[11] At present, the world's major oil supply comes from structural traps.

In the Subcontinent, a Geological Survey Department was established in 1851 with the sole aim to discover coal[12] and the first publication came out in 1879-87 known as Manual of Geology in India. [13]The very first oil discovery was rather accidental, the work on Assam Railways in 1887, resulted in the discovery of oil near Digboi; it was simply gushing out of the earth in a malaria infested jungle. It is worth highlighting that the very first oil exploration in India started in 1866, almost thirty miles east of Digboi. The first well at Dibrugarh was 178 feet deep and reached a total depth of 662 feet; later Assam Oil Company was formed in 1899 and was producing 7000 barrels of oil daily at its peak output. In the present-day Pakistan, before it gained independent in 1947, the very first exploration of oil was undertaken by Punjab Government in 1886- 87;[14] In 1866, some seven or eight holes were dug in and around the seepages near Fatehjang, 25 miles west of Islamabad, and in Kundal (Kishor Range) yielding a few gallons of oil per day. Then, in 1870, B. S. Lyitaan, an American from Pennsylvania was hired to investigate the oil prospects of the Punjab. His report is of special interest, since its maps were probably the first ever published on which subsurface structure was delineated by contours. [15]In 1885, in Balochistan, thirteen oil wells were drilled on the oil seepages at Khattan , it was quite a success as almost 20,000 barrels of oil were produced till 1892 when wells became dry. The impetus for this drilling was to establish a convenient source of fuel for the railway system which the then Indian Government was constructing to help secure the Afghanistan - Indian border (Durand Line).

Prior to World War I, various investment syndicates (mainly British financed) were formed to explore in the Punjab, the first significant company The Attock Oil Company was established at London on 1st December 1913. Attock Oil Company in collaboration with Burma Oil Company (BOC) in 1915, drilled at Khaur in District Attock; oil was discovered in Miocene and Ecocene reservoirs, it produced oil in excess of four million barrels till 1990. Burma oil Company (BOC) was also engaged in explora-

10 Stephen Howrath *A Century in oil*,pp-17-22.
11 B.R. Hussain *Paleography, a tool for oil exploration in Pakistan*
12 https://www.gsi.gov.in/webcenter/portal/OCBIS?_
13 A.H.Kazmi, M.Q.Usman *Geology and Tectonics of Pakistan*. Karachi; Graphic, 1997,pp,10-30.
14 http://www.ppepdr.net/IOP-Brochure.pdf Ministry of Petroleum Pakistan
15 Ministry of Petroleum and Natural Resources, Government of Pakistan , *Investment opportunities in Pakistan's upstream oil and gas sector,* 2009.

tion, it carried out surveys including gravity survey of Potohar; they drilled an exploratory well' Chandragupt-1' at Makran Coast ; to a total depth of 810 meters in 1916. Later both AOC and BOC made a combined exploration efforts and consequently Dhullian in 1936, Joya Mir in 1944 and Balkasar in 1946 were the major oil fields discovered in United India and they all became part of Pakistan.

Momal ji Mari

Ruins of Mari near Ghotki - Sindh

The word *Mari* is a Sindhi word, etymologically meaning; 'birthplace', importantly a place where oil can be found; a trading place of oil. The folklore[16] highlights that almost a millennium ago, there lived a rajah in the present day Daharki area, and he had seven daughters among whom Momal was the most beautiful. The mud palace itself was a remarkable feat of architecture, designed by the daughters themselves, in a manner that only they knew the correct path to the chambers. When the time for their marriages came, Momal put forward the condition that, only that man could be her husband who could answer all her questions and be able to reach the courtyard. Many a prince came and lost everything in the quest to marry the most beautiful princess of her time.

16 Shah Abdul Latif Bhittai died 1761 A.D., a renowned Sindhi man of letters wrote some fabulous love stories, about seven women in the medieval era.

Momal Ji Mari Museum

A day came when, four noble persons from the desert lost their way while hunting and found themselves in a conversation with one such prince who had lost everything in a bid to win over Momal. One of the noble name Rano was finally able to win over ‑Momal, but in the process he had offended his other colleague including the raja to which he was a minister. The power of love was such that Momal and Rano could not live without each other, every night Rano would burn the oil so her lover could keep his direction.

I trimmed the wick again and again
Oil is consumed at last
Stranger-beloved, do return
Riding a camel fast,
Weeping for Rano, night is past
The whole night I wept

O Rano: I am daily scanning your road
for you. The pain is that by your association
you have, as it pastured my heart unto
yourself by means of wires. Nay, I am
inseparably attached to you by the nails of love.

Rano was put under the duress of his friendship with the rajah who being jealous ordered Rano not to meet Momal again; love is such a feeling that such restrictions have seldom stopped lovers from fulfilling their soul mating. Rano would travel in disguise on camel, every night travelling long distance and still being able to be at rajah's palace in the morning. This secret

The folk tale is set in the period of 1300 A.D. on the banks of River Indus

did not last long and rajah imprisoned Rano. On the other hand, Momal unaware of Rano's captivity, kept on burning oil every night so Rano could find his lover. One such night, Momal's sister Somal slept with her to console her sister, as fate would have it, Rano was able to make his way to Momal's chamber on that very night and on seeing someone sleeping with Momal, left dejected.

Momal in the morning saw the footprints and the cane of Rano and instantly realized what tragedy fate has played with her. She soon left her palace in disguise and reached her lover's kingdom where she yearned just for his sight. One day she was able to meet him and narrated him the truth which Rano did not believe and as such in order to prove to him her true love, Momal left the palace and jumped into a burning oil well. Rano, as soon as he learnt about Momal realized how wrong he was, and ran after his love in a bid to save her. Alas! It was too late.

Momal waiting for Rano with a burning lamp

Grieved by his fate, Rano also jumped and died in the burning oil well fire to reunite with the love of his life, Momal.

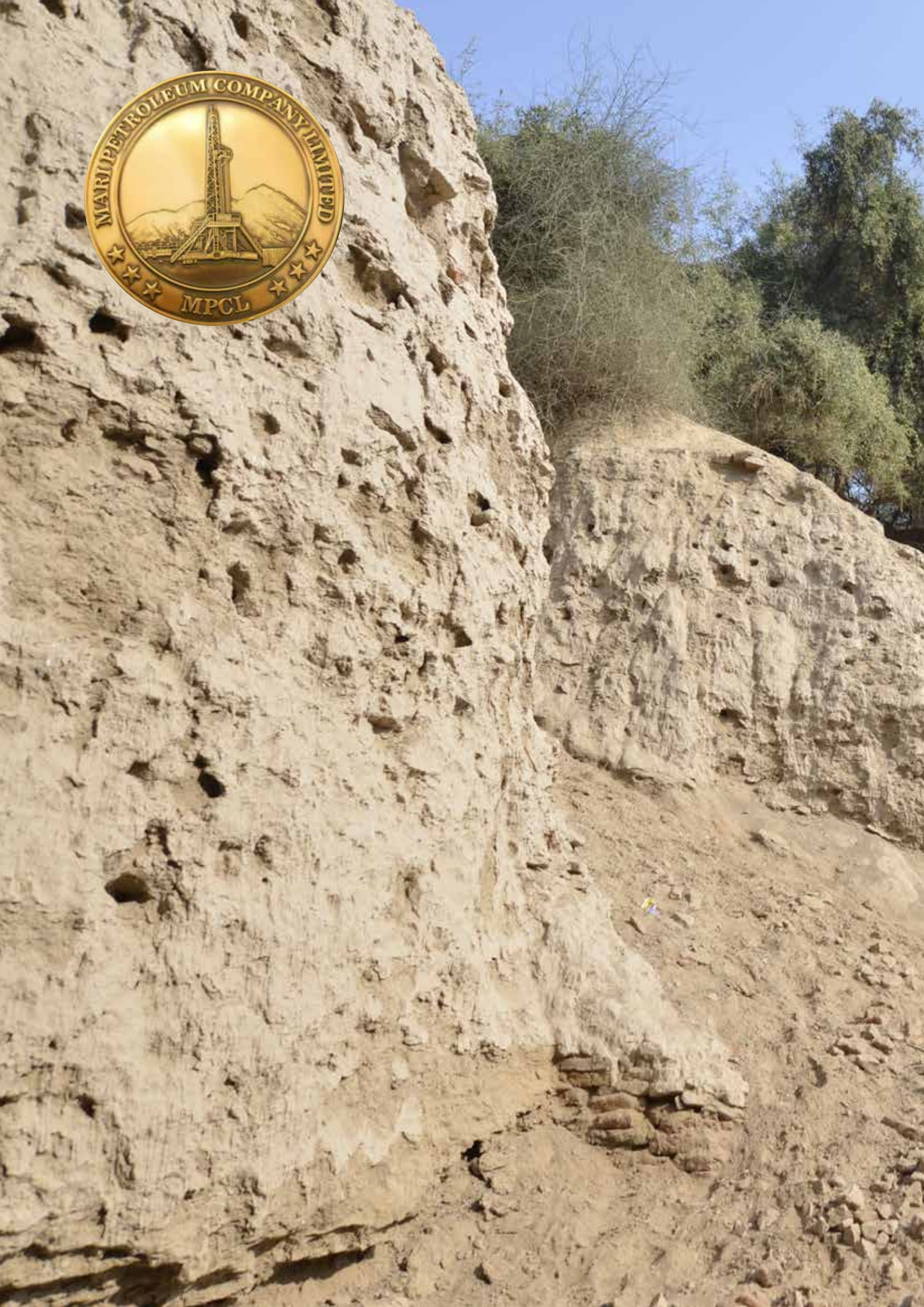
Rano and Momal near a well

Momal Ji Mari is now a ruin, and is ranked among the archaeological heritage of not only Sindh but also of Pakistan. The folklore is also among the five classic love stories of Pakistan.

From the perception of oil and gas, the fact that oil was being traded in the area almost half a millennium ago rouses excitement. The folklore played an important role in the initial exploration of oil and gas in the area by the ESSO. When gas was finally discovered, the field was named after the *Mari*; an ancient name for 'place where there is oil'.

Apart from the Momal, there were eight more Maris (oil bearing areas) as mentioned in ancient folklores; thus oil was the trade and power in Vedas era. It is testimony that the very first oil fields in the subcontinent were discovered among these Marris including, Marri Indus at Attock. The very first natural gas reserves in subcontinent were also discovered not far from Marri tribe in Baluchistan. The present-day Mari Gas Field falls in Jaisalmer High, '*the Jaisalmer basin extends 30,000 square kilometres in South west Rajasthan, it extends to Mari region of Pakistan and forms part of Indus Basin*'.[17] Therefore apart from historical folklore, the geographical data validates the presence of hydrocarbon in the area encompassing the story.

17 Alok Shukla *Jaisalmer Basin, an integrated study.* Department of Applied Sociology, Indian School of Mines, Dhanbad.

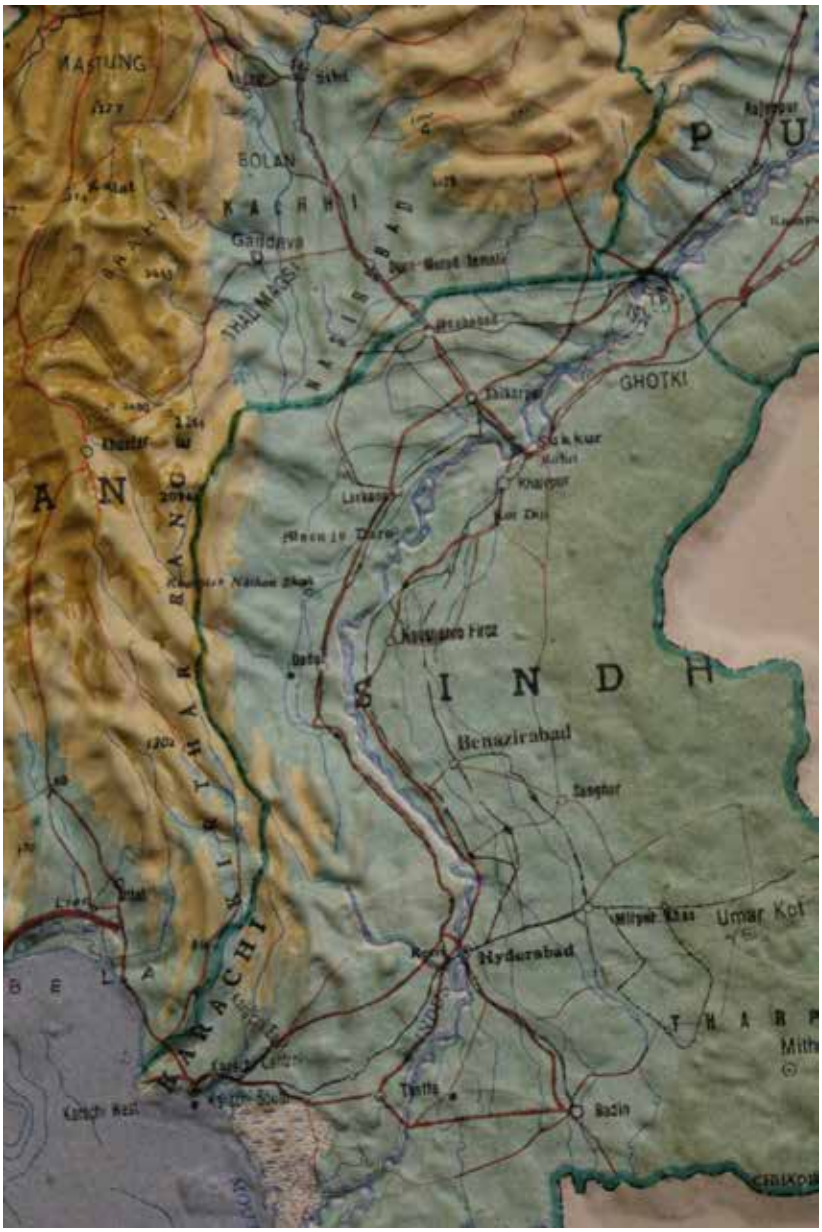

MARI PETROLEUM COMPANY LIMITED
MPCL

Momal ji Mari

Chapter II

Stanvac & Mari Gas Field, 1957-1984

At the time of independence in 1947, there were four oil wells in Pakistan namely Khaur, Dhullian, Joya Mair and Balkasar.[1] All of these wells were in Punjab and owned by Attock Oil Company (AOC) producing 1500 barrels per day, the remaining oil requirement of the country which totalled 7500 barrels was imported.[2] Oil exploration was given a priority by the new government, thus an act was passed in January 1949 which regulated the oil exploration in the country. The act specified that contracts with oil companies will be on production sharing. It was enacted that any foreign company carrying out exploration in the country employ at least one quarter of work force from local population. Minimum of 250 and maximum of 5000 square miles of area be allotted for a period of three years for exploration.[3] In 1949, Pakistan Oilfields Limited (POL) was formed; it was a subsidiary of Attock Oil Company with government having 33% shares. In 1950, another company, Pakistan Petroleum Limited (PPL) was formed, it had its roots in Burmah Oil Company (BOC).[4] The very first oil well after independence was drilled at Lakhra near Karachi on 2 May 1948, by BOC , it was drilled to a depth of 12,666 feet in Sembar formation; the well was later abandoned.



Map of Indus Valley, heart of Natural Gas reservoir

1 Ministry of Energy (Petroleum Division) Hydrocarbon Development Institute of Pakistan. *Pakistan Energy Yearbook-2016.*
2 *Pakistan Petroleum Policy 1991* . Government of Pakistan, Ministry of Petroleum and Natural Resources, November 1991.
3 Government of Pakistan Act No.XXIV of 1948 ,dated 8th January 1949, titled *The Regulation of Mines and Oilfields and Mineral Development (Government Control) Act,1948.*
4 *Pakistan Petroleum policy 1991* .

Pakistan Oilfields Limited on 10th October 1951,[5] made a spectacular discovery of large reserves of natural gas in the Sui Main Limestone of Early Eocene age in Bugti tribal area, on the Sui structure (located in Baluchistan Province), in Central Indus Basin. The original recoverable gas reserves were estimated to be over 10 trillion cubic feet (TCF) equivalent to about 1 billion barrels of oil, the heating value of the gas being 955 Btu. The discovery of Sui Gas Field was the first major milestone in the search for hydrocarbons in Pakistan. It brought an economic and social revolution; within a year gas pipes were laid till Karachi and domestic life style changed. Cooking became safe and easy, reliance upon oil for domestic use was reduced considerably. Sui Gas Transmission Company (SGTC) was established in 1954, the very first gas company of Pakistan, a sister company Sui Northern Gas Company Limited (SNGPL) was raised in 1962.[6]

In the wake of the natural gas discovery at Sui in 1951, international oil companies joined the modern day gold rush. Karachi became the hub of economic and social activities. In 1954, Standard Vacuum Oil Company (Stanvac) was the first oil company which came to Pakistan in search of oil and gas; followed by Hunt International in 1955, Shell Oil in 1956, Sun Oil in 1957 and Tidewater in 1958; all were American oil companies in search of oil. Between 1954-1959 no less than 34 exploratory oil wells were drilled and natural gas was discovered at Zin, Uch, Mazarani, Khairpur and Kandkot by (PPL) and Stanvac at Mari; all in Eocene limestone reservoir. Only notable oil discovery was at Karsal in Potohar region by PPL and POL but quantity was less.[7]

Pak-Stanvac Petroleum Project (PSPP).1954

On 24 September 1954, a memorandum of understanding was signed between Pakistan and Standard Vaccum Oil Company; resultantly Pak-Stanvac Petroleum Project[8] took birth. Stanvac was one of several dozen oil companies which were formed in America after the giant oil company Standard Oil Company was spilt into 34 companies through a court decision. At the time of dissolution, Standard Oil Company owned almost 90 % of oil business in USA. Stanvac was one of the several dozen oil companies which took birth in America after the giant oil company Standard Oil Company which owned almost 90 % of oil business in USA was dissolved through a court decision. Stanvac a reputed company was operating in the region since 1913 in Bengal exploring oil. Under the agreement, Pakistan Government held 25% shares, Mobil having 37.5% and remaining shares by Esso Eastern. The concession area comprised of 10,000 square miles in West Pakistan and 15,000 square miles in East Pakistan.

Pakistan had inherited only a skeleton of geographical survey on independence as majority of equipment was at Calcutta. However, the government patronised it and departments were opened in universities at Karachi, Lahore and Peshawar. An extensive seismic survey of the country including aerial survey was carried out by the Geological Survey of Pakistan with the assistance of Canada and

5 *Pakistan Energy Yearbook,2016*.,p-93.
6 *Petroleum Policy 1991*, Government of Pakistan.
7 Iqbal Kadri *Petroleum Geology of Pakistan,* Pakistan Petroleum Limited , Karachi, 1995, pp,3-14.
8 Gazette of Pakistan, 30 December 1976.

USA. Stanvac during its exploration in 1955 conducted Aeromagnetic Survey of more than 1,000,000 square miles and Gravity Surveys covering 10,000 square miles alongwith 4000 square miles of seismic survey; surface geological investigation was completed by December 1956.[9] PPL was the pioneer that carried out survey after independence in 1949, and also between 1956-60, followed by Hunt in 1957-59 and Tidewater in 1959-60.[10] However it was the historic folktale which acted as the beacon and exploration was finally focussed in and around Daharki; almost an eagle's flight east of Sui gas field.

Daharki is a frontier town situated between Sindh and Punjab. In 1955-56, when the initial exploration was initiated by ~~the~~ Stanvac Company, there was no air link between ~~Karachi~~ and ~~the~~ Daharki, the only way other than the sixteen hour drive was an equally laborious rail journey.

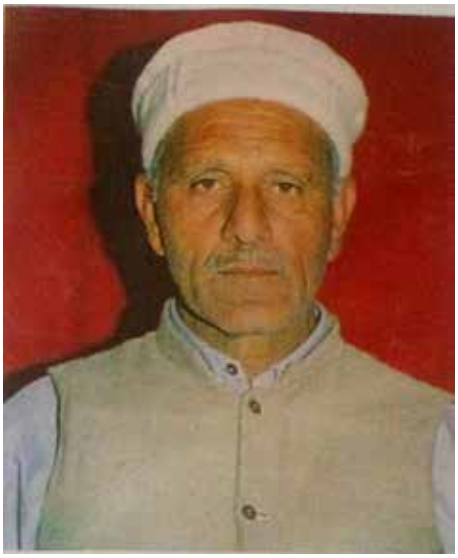
During that time, there was no electricity, medical facilities, educational institutions and locals had no access to fresh drinking water. Radio was the main source of news for the locals and foreigners as there was no television; it came in Pakistan in 1964. Initial exploration was conducted in the summer heat of Sindh with temperatures soaring to as high as 50 degrees Centigrade. Mr George and Mr Roberts were the two pivotal figures who spearheaded the initial exploration in Sindh.

Exploration then and even today is still based upon principle of assumption, although in our era the technology has greatly advanced the chances of success yet it is not guaranteed. Mr Roberts was a tall, bald man in his mid-forties with a good sense of humour; a prerequisite for a successful explorer. After initial marking of the intended drilling site, the machinery was brought by road from Karachi. The process of drilling is laborious and requires an immense patience. It took almost a month of drilling and it was decided that efforts be continued for another two days and if no result found the well would then be abandoned; a usual practice in oil exploration. Summer is cruel in rural Sindh thus the days at camp invariably started at dawn, camp was established under the canvas, and after a long day, during and after dinner the men would sit around and share their tales of life. Language was a barrier but soon locals and foreigners both picked and devised easy signals and vocals. As Juma a local recalls,

9 A.Munir,S.Asim,S.A.Bablani,A.A.Asif Seismic Data interpretation and Fault Mapping in Badin Area, Sindh,Pakistan. *Sindh University Research Journal*, Vol.46 (2)2014. .pp,133-142. *Mari News* vol-5,issue No.4.

10 A.Munir,et al "Seismic Data Interpretation and fault Mapping in Badin Area, Sindh". *Sindh University Research Journal Science Series*,vol,46(2)133-142 (2014).

'The presence of white skinned men was a novelty in the tribe, we were living in bhashas, and reed built huts. There were few animals in our clan as well; usually we migrate with the water and weather. Life was tough only I did not know at that time. I do remember when gas was discovered, it was evening and our clan elders were sitting together smoking tobacco and we children were sitting close by when, they narrated how white men who had been digging for the gold of Momal, found the gas, a gas which can kill anyone who tries to venture near the treasures of Momal'



Muhammad Sadiq
joined South Eastern Drilling company in 1956, He served as Grader Operator on the 1st Well of Mari

Mari X-1 was the very first well drilled, at 1535 hours on 7 July 1957. It took another year of drilling before this well became operational and with this the area, company and the country was ushered into a new era. Two more wells Mari X-2 which was a dry hole and a flank well Mari X-3 were drilled. Estimated gas reserves were in range of 4 Trillion Cubic Feet (TCF). Wells were drilled to a depth of 2053 meters in sub section of the lower Kirthar 'B' limestone formation. Pak –Stanvac apart from finding gas in Daharki, also drilled in East Pakistan, 'while drilling for oil at Kuchma in Bogra District, the project struck a thick seam of coal at a depth of 8,000 feet'.[11] All in all, the Pak-Stanvac drilled eight exploratory wells in West Pakistan and three in East Pakistan, a total depth of 1,25,966 feet was drilled.[12]

11 Mari News Volume No.5, October-December 1996.
12 Information brochure published by ESSO in 1970.

South Eastern Drilling Company was engaged by Esso for drilling. Muhammad Sadiq born in Poonch (Azad Kashmir) came to Sindh in 1956 and soon found a job with the drilling company as driver. He was later employed by Esso as permanent staff. It is worth highlighting that he remained on active service till 1993. Another notable person to join Stanvac in 1962 was Muhammad Sadiq, a resident of Rawalakot (Kashmir) who came to Karachi in 1953 and served as domestic help before joining Stanvac in 1962 as a driver. '*I was initially assigned the duty to drive Mr Macpherson the managing director, we had a Mercedes Benz then, I fell in love with the car and took extra care of it, resultantly after two years I was made general manager of drivers. There were no less than ten drivers under me. High point of my career is that till 1997, when I retired, I drove Mercedes only. I was given a letter of appreciation by the Mercedes Company for proficient driving of their brand'.*

Muhammad Shafi

The producing formation Habi Rahi Limestone is of middle to upper Eocene age. The reservoir is spread over 181417 acres, it is 300 feet thick at a depth of 2053 feet and the gas zone is approximately 177 feet in thickness. The gas itself is dry with 70.6% Methane, 20.1% Nitrogen, 9.0% Carbon Dioxide and 0.3 % Ethane. The high percentage of Carbon Dioxide made it perfect for fertilizer industry.[13]The

Gopa is the local living habitat in and around Mari Gas Field

13 Mari News Quarterly, Volume no.1 issue No.1 October-December 1993.

Mari Well No 1 - 1957

MARI PETROLEUM COMPANY LIMITED
MPCL

Fresh drinking water is the main concern for the women folk in Mari Gas Field

heating value based upon the average of first seven wells was 723 BTU. The gas in Mari Field is produced from carbonate of Eocene age; the other major gas field (Sui) is also carbonate in nature. One fifth of earth's package of sedimentary rocks are made up of carbonate i.e., limestones and dolomites. Carbonates are born in or close to the environment of deposition.

Engro and Mari

Pakistan itself underwent a transition when the military took over in a bloodless coup; General later Field Marshall Ayub Khan took over the reins and remained in power till 1967. This decade provided Pakistan with ~~an~~ economic stability, Indus Water Treaty was signed with India, thus marking the beginning of a peace which lasted till 1965, when both countries went to war. One of the major achievements of General Ayub Khan was the introduction of mechanical

Daharki is the frontier between green line and sand dunes

agriculture in the country. Land holding, distribution and production were all addressed and tractors and fertilizers were introduced. In 1962 the very first oil refinery was commissioned at Karachi followed by another in 1966.

Villages in Northern Punjab with rice crop

Based upon the gas discovery in Mari, on 21st December 1964, ESSO Eastern's general manager Mr Strasburger gave the details of what was the biggest foreign investment in Pakistan at that time. Esso was to build a new 26 Million US$ fertilizer plant at Daharki, the largest of its kind in the world, scheduled to be operational by the end of 1967. 'The plant will produce 1, 75,000 tons urea fertilizer a year'. Esso was to invest 19 Million US$ and the remaining amount was to be invested by the Government of Pakistan.[14] Pak- Stanvac after the discovery of gas at Mari had ventured into the petroleum business as well as opening new petrol pumps in different cities of the country including Sheihkupura.[15]

The fertilizer plant was dependent upon the newly discovered gas. Mari Gas Field expansion

14 New York Times, dated 24th December 1964.
15 Lahore High Court Case No. W.P 18645/2011.

was launched in December 1965 and completed in March 1966. Five wells were commissioned and completed by the Mothercade Company, later in 1968-69; five more wells were developed providing 39 million cubic feet of gas to the newly commissioned ESSO (Engro) plant. The plant was commissioned on 4th December 1968, its structure having a height of 325 meters is still considered to be the tallest of its kind in Pakistan. This plant was strategic in nature as it ushered Pakistan into the green revolution. The per acre yield from an acre in upper Punjab rose from twenty maunds per acre in 1955 to almost double by end 1970s. Inayat now seventy years old is a Punjabi farmer, he recalls. *' I was young when for the first time Engro fertilizer came , initially farmers were reluctant to use it as they felt that it will have adverse impact on the crop , with passage of time, the yields were so drastically high from the conventional manure that everyone start using fertilizer and now it is almost unthinkable to do farming without fertilizers*.'[16]

Engro plant under construction

Engro Colony under construction

Construction of ~~the~~ Daharki plant provided a big boost to the locals in terms of ~~the~~ job opportunities and economic prosperity. Nassebo is one such person whose life underwent drastic positive changes due to the Mari Gas Field. Born in 1944 in an open tent, she was the sixth in hierarchy of her poor family, whose sole substance was either begging or doing petty job on day to day basis. Customarily, the girls in the area are tied into nuptial bonds at an early age, in order to lessen the feeding burden on the family. There was no concept of education, health or sanitation among the thousands of such people living on the edge of poverty and misery. Naseebo like others worked on the construction of the plant along with her other siblings. Now in mid-seventies, she

16 Interview with Inayat Ullah in June 2019 at Wazirabad

recalled those times. Naseebo who was married a year earlier and had become a widow as her husband died in a road accident. ' *I was in the working class, women in my area are physically tough, I used to carry as much load as other but by and large the company had relaxed policy for women labourers. We would carry the bricks in dozen over our heads, we were paid sometimes daily at times on weekly basis. When I was paid for the first time, I was overwhelmed with joy, this was the first ever pay of my life*.' Naseebo, in a sense remained associated with the Mari Daharki Gas plant from its inception till to date. Her two sons and four grandchildren all worked in Mari; her first grandson was not born in an open tent but in an air-conditioned room of Mari Hospital established by the company for the workers. ' *Mari Company has changed the life of many women in my clan, tribe and area, today we have access to drinking water, and women no more have to undergo the agony of pain and desperation thanks to the hospital and free medicines provided by the Mari. Future of our grandchildren is as bright as anyone living on the face of earth, they are getting good education free of cost and are ensured of having job opportunities in the company*.

Allah Rakhiyo Khatian

Allah Rakhiyo Khatian joined the Pak-Stanvac in April 1970, 'I am a local Sindhi from Khatian tribe and belongs to an unprivileged but proud family, after the completion of my matric, I could not see any scope of higher education and as such had to join the workforce from an early age, I was hired as a labourer on a daily wage of Rupees one and half. Syed Azhar Hussain Rizvi was in charge of us, a very good man indeed, so much so that amongst the locals Marri Company was known as the Rizvi Company. Mr Syed Ali Hussain Rizvi was the technical manager and joined the Stanvac from its inception, he played an important role in the establishment and development of Mari Gas Field; he retired in October 1993. Another notable was Behram Ali Meerani who belonged to Goth Sain Dino which is two miles from Daharki. Meerani joined ~~the~~ Esso Eastern as a helper in 1968 right after completing his matriculation examination. With the passage of time and through his hardwork, earned several promotions and became senior instrument technician by the end of 1994.

Mr. Rizvi (standing) on his retirement in 1993

In 1967, Government of Pakistan passed an ordinance on 23 May; *Natural Gas Development Surcharge Ordinance*. Under this ordinance, natural gas was defined as 'gas obtained from boreholes and

wells consisting primarily of hydrocarbons'. 'Every company shall collect and deposit a development surcharge equivalent to the differential price it collected after 31 May 1964'.[17]

It is worth highlighting that majority of international oil companies had left Pakistan after failing to find any worthwhile oil discovery. In 1961, Government of Pakistan in collaboration with Union of Soviet Socialist Russia (USSR) raised Oil and Gas Development Corporation (OGDC). Their first success was in Sarai Singh (Sindh) with little quantity of gas found. The first major oil discovery in Pakistan was made by them in 1968 at Toot (Potohar Punjab). Pakistan Oilfields Limited also discovered oil at Meyal in 1968. Offshore drilling was also given due attention. It is worth mentioning that very first off shore exploration was carried out by Sun Oil Company in 1961, they later drilled wells at Daboo Creek (1963) Patian Creek (1964) and Korangi Creek (1964). Wintershall a German company conducted seismic survey of 24 folds covering 9400 square kilometres in 1969-72 and drilled three wells namely Indus Marine A1 in 1972 and last one Indus Marine C1 in 1975. Husky of USA carried out seismic survey, between 1976-78 of 2,380 square kilometres and drilled one well Karachi South A1 in 1978. Marathon of USA drilled one well at Makran in 1976-77 but abandoned it due to unmanageable outer pressure. However, gas condensate discovery at Dhodak in 1977 by OGDC is the only worth highlighting oil discovery of the decade.

1971 is a sad year in the history of Pakistan; the year long civil war in East Pakistan, rooted in history and blossomed over the economic disparity between the two wings finally erupted in a conventional war with India; the main sponsor of anarchy in East Pakistan. Daharki gas plants also came under air attack from Indian Air Force. On 9 December 1971 at dusk, two Indian Air Force aircraft appeared on the horizon, there was no anti-aircraft artillery present at Daharki, these intruding aircraft made low pass and dropped few bombs which were well off the obvious intended target (Esso plant) however one worker Allah Dino was killed and other Noor Baksh Mehr was injured due to enemy aircraft strafing.

Post 1971-Mari

In the aftermath of the 1971 War and secession of East Pakistan, the country initially underwent a period of gloom, however within a year it was back on its feet. A new democratic regime with a powerful parliament set the pace for progress. In 1973 Arab-Israel War, oil was used as a weapon and as such a new paradigm emerged internationally in which fuel became a security and economic concern. Pakistan was meeting almost 60% of its fuel requirement domestically and as such it boosted the efforts to explore and produce more fuel domestically. In 1974, parliament passed an act authorising government to take over the management of any oil company or to appoint directors, if it felt that such an act is in public interest. It was known as 'an act to provide management and development of marketing facilities in petroleum products'.[18]Government nationalised two oil refineries, and also formed Pakistan State Oil (PSO). Another major step of the government was to establish an institute for hydrocarbon development .[19]

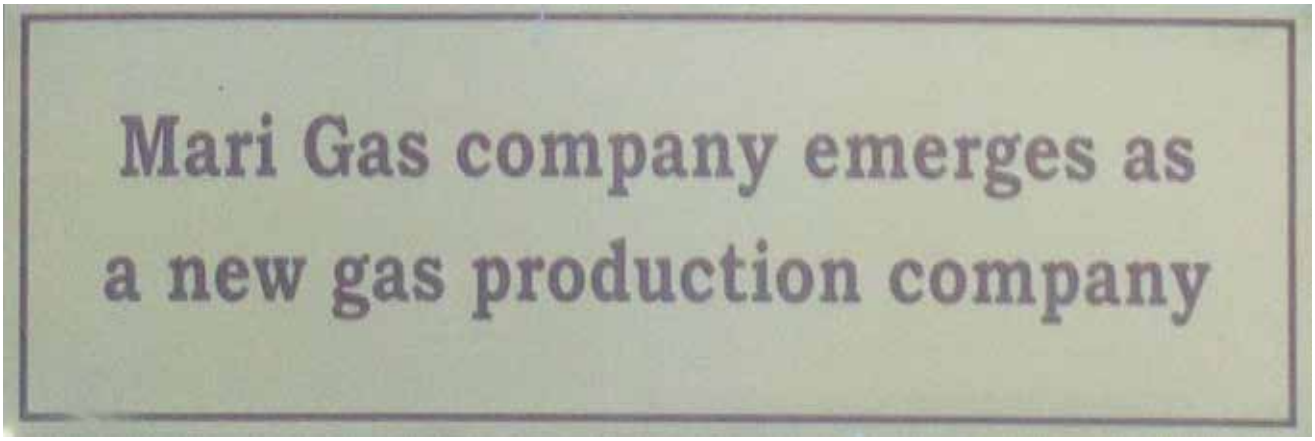
17 Gazette of Pakistan, extraordinary, 23rd May 1967. The National assembly of Pakistan had approved it on the same day.
18 Act No.XVII of 1974, Parliament of Pakistan, *Gazette 8 March 1974.*
19 Hydrocarbon Development Institute of Pakistan (HDIP) was raised in 1975.

Sky Top, The very first Rig

In 1976, ESSO approached Government of Pakistan for vesting of its certain undertakings in the country and an agreement was reached under which Government of Pakistan undertook certain liabilities and business less the natural gas operations of the company.[20] Later ESSO was amalgamated into Pakistan State Oil (PSO).

Operationally the Mari Field had initiated its Phase II development plan in 1977, it was carried out to meet the additional requirement of supplying gas to newly commissioned Pak-Saudi Fertilizer at Mirpur Mathello, and it was initiated in November 1977 and completed in February 1978. Nine productive wells were drilled and an additional 80MMSCF were being produced, the expansion had cost Rupees 26.7 million.

In May 1981, Phase III of ~~the~~ development in Mari gas field started and completed in July same year, seven new wells were drilled and completed; the driving force of this phase was the new Fauji Fertilizer plant at Goth Machi which required 90 MMSCF daily. Development phase of Mari in 1981 coincided with the first ever discovery of oil at Khaskheli (Sindh) by Union Texas; it is regarded as watershed event in Pakistan's oil history as it negated the paradigm that oil is only available in the Potohar region. In the same year (1981) Stanvac merged in ESSO.[21]

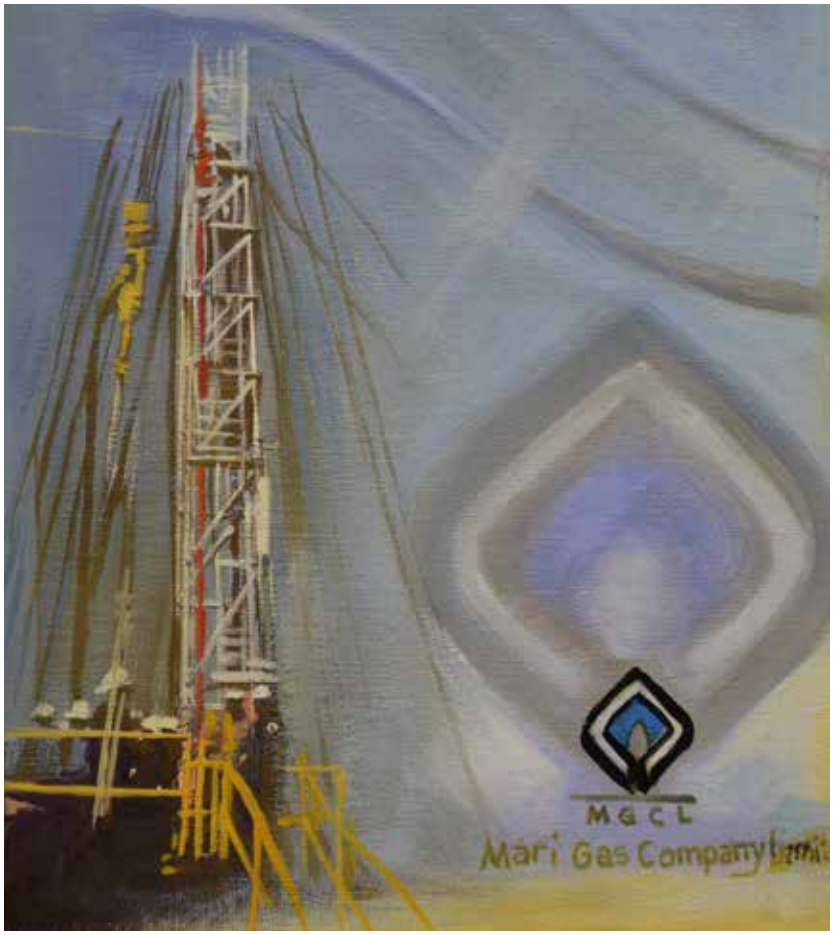


20 Government of Pakistan, *Gazette dated 30th December 1976, Act of Parliament*.
21 Lahore High Court W.P 18645/2011.

1984
Incorporation
of the Company
M G C L
Mari Gas Company Limited

Chapter III

Mari Gas Company Limited. 1984-2012



Fauji Foundation traces its roots to post World War II, a fund known as Post War Services Reconstruction Fund (PWSRF) was established by the British to help over a million servicemen of the British Indian Army who took part in the war; after 1947, Pakistan's share was transferred to the new dominion. In 1954, the Government of Pakistan transferred almost quarter of a million US $ to the Pakistan Army for the benefits of retired servicemen. The Pakistan Army wisely instead of disbursing the amount among the servicemen, not only first established a textile mill but later also established a fifty bed tuberculosis hospital at Rawalpindi. Fauji Foundation established the Fauji Fertilizer Company in 1978 and in 1982 inaugurated one of the largest fertilizer plant in Pakistan at Goth Machi, not far from Daharki.[1] Thus when in 1983, ESSO decided to sell off its majority shares (51%) in Mari Gas Field, (the remaining shares 49% were owned by the Government of Pakistan) Fauji Foundation Pakistan saw it as a golden opportunity to facilitate its newly inaugurated fertilizer plant; decided to purchase shares of ESSO. ' *It was natural that we should have our own gas field for our fertilizer plants, thus when ESSO put forward the idea of selling its shares, I saw it as a god gifted opportunity and convinced my colleagues in the Fauji Foundation and also in the government that we must have these gas fields'.* [2]

There was much deliberation on the nomenclature of the newly raised gas company. Traditionally gas companies at that time were known more by acronyms rather than by name, yet it were the gas fields which caught the public imagination, Sui is one such example. Fauji Foundation also followed

1 https://www.fauji.org.pk/fauji/about-us/aboutus-overview

2 Narrated by major General Rao Farman Ali retired during his visit to Mari Gas Company head office at Islamabad on 15th September 1996.

the same pattern and named its new company after its gas field; **Mari**. On 4 December 1984, **Mari Gas Company Limited** was formed as an unlisted public company to take over the assets, liabilities and operational control of the PSPP (Pakistan-Stanvac Petroleum Project). In the newly formed company, Fauji Foundation had 40% shares, Oil and Gas Development Corporation 20% and Government of Pakistan had the remaining shares. Fauji Foundation had the right to appoint the managing directors. At that time Mari Gas Company had twenty-one gas producing wells, with an output of 200 MMSCF of gas daily; having operating assets worth 140 million Rupees.

Mari Gas Company Limited (MGCL)

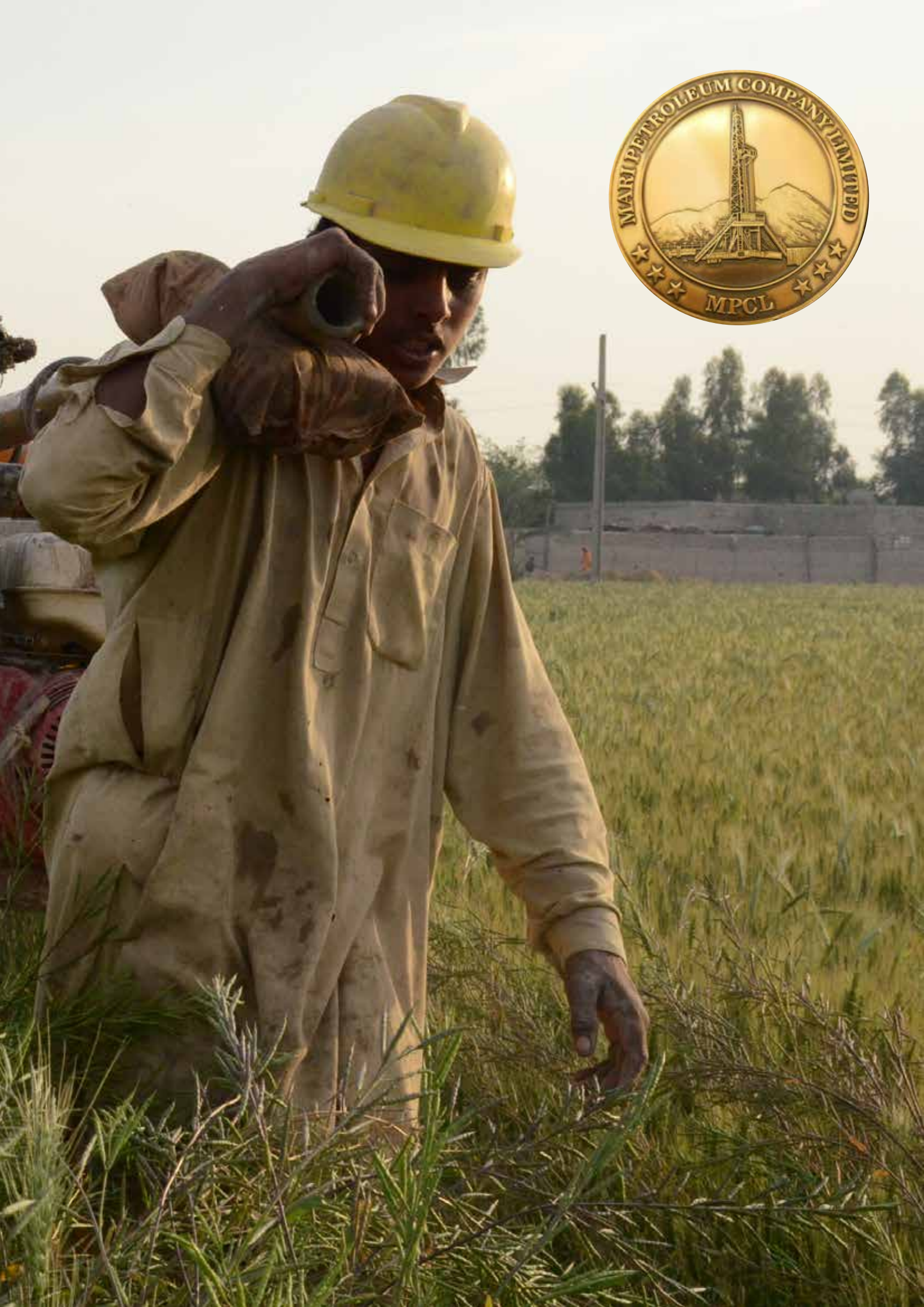
Major General Mahmood Aslam Hayat (retired) was appointed as the very first managing director of Mari Gas Company, he remained in chair for the next seven years (December 1985-February 1992); A man of principles and simple taste, there could not have been a better choice of a person for this coveted position than him. He was commissioned in 19 Light Anti-Aircraft Regiment in 1951 and with the passage of time commanded anti-aircraft command and also performed the duties of deputy martial law administrator in Sindh. A larger than life figure in every sense, fond of cricket which runs in his family along with soldiery. His personality and above all his integrity won the hearts and minds of all. It is worth mentioning that present Chairman Joint Chief of Staff, General Zubair Mahmood Hayat, is his son.

Major General (Retd)
Mahmood Aslam Hayat

Transition from ESSO to Mari was smooth, there were no drastic changes in the working environment of the company, and the aim of the newly raised company was still the same i.e. to produce natural gas. Mari Gas Field is spread over an area of 943 square kilometres; initial estimates of gas in the field were in the range of 9.7 trillion cubic feet. Phase IV of Mari Gas field development was initiated in October 1985, during which twenty-seven development wells along with three step out wells were drilled, the project was completed in March 1986. The main beneficiary of this expansion was the Water and Power Development Authority (WAPDA) which had commissioned a power plant at Guddu, which was to be provided with 100 MMSCFD of gas by Mari Gas Company. At that time Habib Rahi was the only reservoir from which gas was being produced. Reservoir studies of Habib Rahi were carried out in 1967, 1982 and 1983 by the Core Labs (USA), these studies are extremely important because they assess the availability, quantity and commercial value of the gas in the reservoir. A Gas reservoir is a naturally occurring storage area, characteristically a folded rock formation such as an anticline, that traps and holds natural gas. The reservoir rock must be permeable and porous to contain gas, and it has to be capped by impervious rock in order to form an effective seal that prevents the gas from escaping upward or laterally. In 1988 another reservoir study was again carried out by the MGCL, it was done by Peterism a US based company.

Mari Gas Company housed its main headquarters in Islamabad (36 Nazimuddin Road, Sector F7/1),

Mari Phase V expansion - 1993


MAARI PETROLEUM COMPANY LIMITED
MPCL

Mari Gas Company Limited - Managing Director Major General (Retd) Mahmood Aslam Hayat

a regional office in Karachi (G 9/2, Block 9 Kehkashan Clifton) with its field office at Daharki. Muneer Memon was among the very first employees to be hired by the Mari Gas Company; he appeared for an interview on 5th December 1984. Muneer was a geologist by profession and belonged to interior Sindh, '*I was interviewed at Karachi by a panel, as I got up to leave the interview, the managing director Major General(retired) Hayat along with Major General Rao Farman who was the minister of production and also managing director of Fauji Foundation entered the room, they had few words with me and when they came to know that I am a Sindhi, General Farman immediately appointed me as administration officer at Daharki, despite all my protests*.'

Apart from Mr Munir Memon; Mr Mukhtar Aslam Sheikh joined Mari in the administration department, Mr Khalid Jamil and Mr Shaukat Ali joined the company as accountants, Mr Mohib ur Rab and Mr Ashiq Chaudhry joined the production department. Among the drivers Mr Muhammad Maskeen and Mr Khawaja, Mr Yaqoob Bhutto along with Mr Javed Aslam Shah as clerk and helper were among the initial inductees of Mari Gas Company Limited.[3] This was due to Mari's management's desire to hire educated locals amongst its management cadre.

Inspite of the development in Daharki the overall means of communication were slow. The standard pattern of travelling from Karachi to Mari Gas Field was either by train or road, the strenuous journey consumed almost twelve-fourteen hours. Air travel between Karachi and Sukkur was restricted to one daily flight and there were no direct flights between Islamabad and Sukkur. The law and order situation in interior Sindh at that time was unpredictable; buses, cars and even trains were subject to dacoities and robbers, thus travelling from Karachi to Daharki was nothing less than a nightmare. During this time, elections were held in the country; the system underwent a political transition, a new political government came to power and brought about some much needed changes in the petroleum industry.

In 1989, Government of Pakistan introduced Block bidding system, 43 Blocks were offered, total

3 In 1999, all these persons were awarded with fifteen years service awards.

area under concession was about 1,50,000 square kilometres.[4] Mari did not bid for any block, although there were strong arguments within Mari to bid. One major factor for not taking part in the bidding was the mind-set to focus entirely on the existing field rather than any expansion. Later substantial reserves of natural gas were discovered at Qadirpur field not far from Mari gas field by OGDCL Under the petroleum policy of 1991, almost all items required for oil and gas exploration including rigs, seismic equipment, logging trucks, snubbing units were declared duty free.

Under the 1993 Petroleum policy, the country was divided into three zones, Zone I comprised of Balochistan and KPK and was termed as high cost and high risk, Zone II depicts Potohar and termed as high cost and medium risk whereas Zone III encompassing the lower Indus Basin was recognised as low cost and low risk. Furthermore the licence for exploration now encompass 7500 square kilometres and leased for three years.[5] It is a matter of interest to note that between 1866-1992, a total of 301 Exploratory Wells were drilled in the area comprising Pakistan, 290 wells were onshore and 11 offshore. By the end of June 1992, the total reserves of natural gas in Pakistan were 31.157 trillion cubic feet. Pakistan was producing 65000 barrels of oil and 1.5 billion cubic feet gas daily, whereas it was importing 64 million barrels of oil; costing 1.8 billion US$ annually.[6]

Lt Gen (Retd) Hamid Niaz

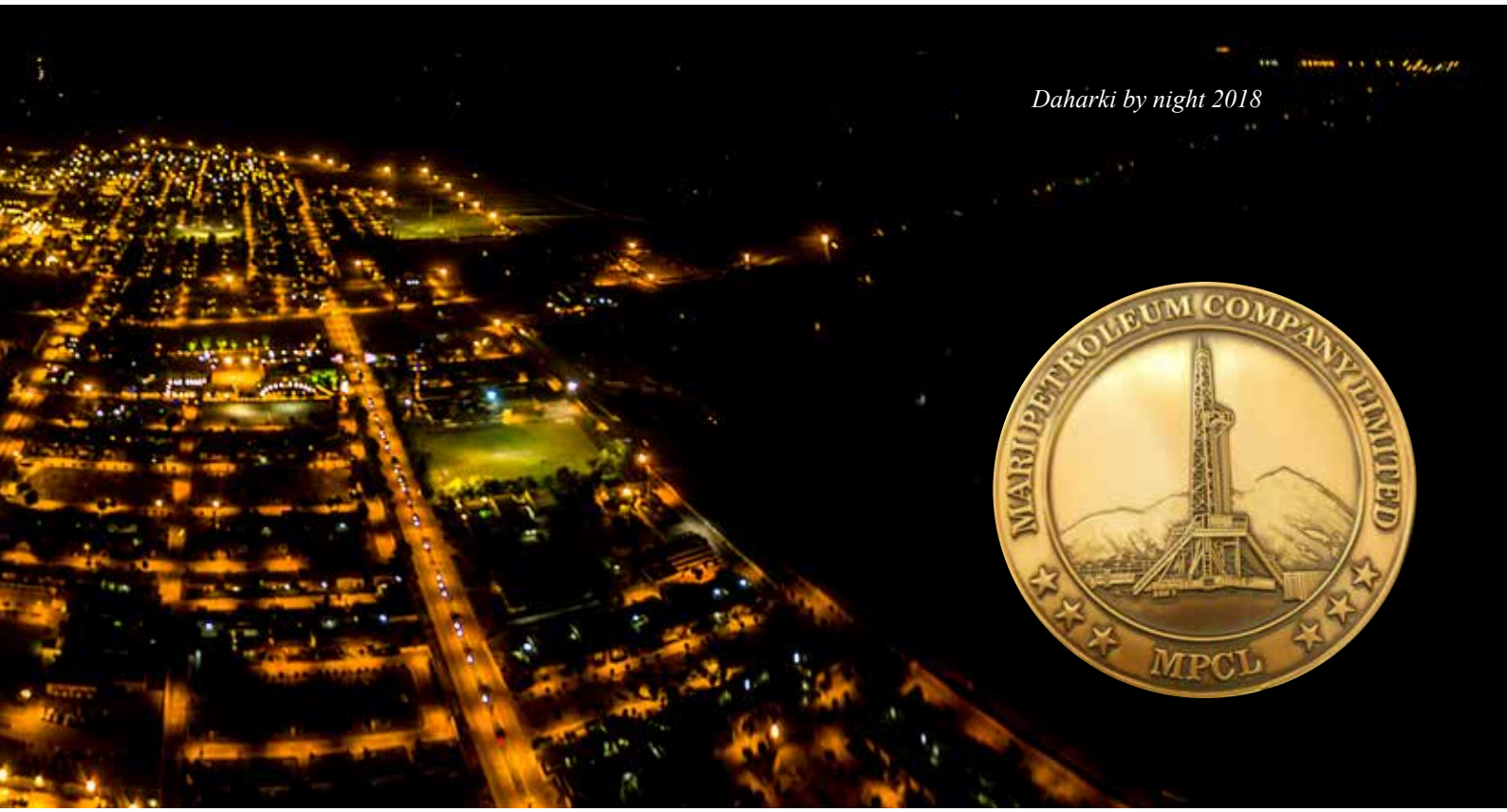
Commissioned in the Pakistan Army on April 26, 1959 and embarked upon, what turned out to be, a long and distinguished career. In recognition of his meritorious services, he was awarded Sitara-i-Imtiaz (Military), Hilal-e-Imtiaz (Military) and Sitara-e-Bisalat. He was appointed as the Managing Director of Mari Gas Company Limited on March 08, 1992. He took over as the Chief Executive at a juncture where the Company had already under taken the major development project. His open door policy, easy accessibility and remarkable quality of being a patient listener are greatly admired by all his associates and subordinates.

In 1992, Lieutenant General Hamid Niaz (retired) was appointed as the new managing director; moreover the tenure of managing director was set to three years. Appointment of a lieutenant general (retired) highlights the confidence of the Fauji Foundation and the Government of Pakistan in ~~the~~ Mari Gas Company Limited. He took over as the chief executive at a juncture where the Mari had already undertaken the major development project. Speaking of his personality, he is remembered for his open door policy, easy accessibility and above all his remarkable patience as a listener.[7]

The facilities and production capacity of Mari Gas Field had been gradually and systematically enhanced under four development projects from 1965-1985. In 1992, the Fifth Development Phase of

4 Iqbal Kadri *Petroleum Geology of Pakistan*, Karachi, 1994. pp,10-18.
5 Iqbal Kadri *Petroleum Geology of Pakistan*, pp-367.
6 Petroleum Policy 1991, Ministry of Petroleum.
7 Mari News, Volume 1, issue 1, 1993.

Daharki, Summer 2018



Daharki by night 2018

Lt Gen (Retd) Hamid Niaz having an informal discussion with the field staff during Phase V

Mari Gas Field was undertaken to supply gas for the expansion projects of Fauji Fertilizer and Engro Chemical Pakistan Limited. The expansion phase comprised of drilling thirteen Development and four Step-out Wells, along with the construction of a Pipeline Gathering System including a Central Manifold No.2 located at a distance of 800 meters from existing Central Manifold. The gas gathering system was thus enhanced from 120 kilometres to 165 kilometres. Financing of the expansion project was through a loan of 19.5 million US$.

Remarkable flexibility is created between two manifolds by inter connecting inlet and outlet headers at both manifolds through two sixteen inch diameter pipelines. This created an ideal facility to switch processed or unprocessed gas from one central manifold to the other central manifold to meet any emergency. The gas from one segment can very easily be switched from header designated for fertilizer to that for WAPDA, facilitating the system to distribute the wells according to their gas composition requirement. Later a comprehensive program was launched to upgrade and harmonize the outlook of these two manifolds. The objective was achieved by hauling of about half a million cubic feet of earth and laying three inches downgraded ballast stone.

Ten development wells were drilled using a hired rig in record time of 75 days. These wells were then connected to the gathering system. As a result, the field capacity was increased from 300 MMSCFD to 400 MMSCFD. The drilling program was designed by the MGCL staff, and the design of the gas gathering system was done by Nova Corporation. The supervision of both the drilling and the

construction of gas gathering system was carried out by MGCL personnel, they also installed the Cathodic Protection System of the gas pipelines independently. Better planning and closer supervision of the drilling contractor improved per well drilling time of 7.5 days compared with what was the historical average in the field of about 14 days. The cumulative gas produced during the year 1994, from 59 producing wells was 140,017.481 Million Standard Cubic Feet (MMSCF). The daily average gas production for 1994 was 384 MMSCF per day as compared to 355 MMSCF per day in 1993. Engro, Pak-Saudi and Fauji Fertilizers were the main customers of Mari, receiving a committed 300 MSCF daily with WAPDA power plant at Guddu getting the remaining 100 MSCF. [8]

Cathodic Bed, a 460 feet long 6 feet wide 6 feet deep at Well No. 38

Mr S.M. Salahuddin[9] who had joined Mari in 1990 as planning manager and elevated to as technical manager in 1993 was assigned the overall responsibility to implement the Phase-V. Mr Muhammad Ali Mughul who had joined Mari in 1985 as senior petroleum engineer was the production superintendent and not only he supervised the Phase IV, but he was the team leader for the Phase-V. Another name worth mentioning is Mr S.M.Jamshed Iqbal who had ~~had~~ joined Mari in 1979, he headed the project development department, 'he has been an anchor person during planning, designing and execution

Central Manifold Gas Gathering System

8 Mari News, Volume 1, issue 1, 1993.
9 Mr S.M. Salahuddin, did his Bachelor of Engineering from University of Oklahoma in 1965

Managing Director Lieutenant General Hamid Niaz (Retd) at Daharki field Phase V

stages of major development phases Phase IV and Phase V'.[10] The development of Mari Gas Field will remain incomplete without highlighting the efforts of Muhammad Ajmal Abbasi, a petroleum engineer who joined Mari in 1980 and was a key figure during the Phase III, IV and V development; he led the reservoir department. Fateh Muhamad Buriro who had been with the Mari since 1982 as operator of heavy equipment was regarded as a model worker during the Phase III, IV and V[11];

First ten years of Mari Gas Company. Mari had increased the number of producing wells from 21 to 59. Its total operating assets increased from 140 million Rupees to 702 million Rupees.

From June 16, 1994 onwards, the shares of Mari Gas Company Limited were being listed and traded on the Karachi Stock Exchange. Under the Privatization Policy of the Government of Pakistan, half of the shares held by the Government were divested and were offered to the general public and the employees of Mari. A temporary 'Shares Department' was established in June 1994 under Company Secretary Mr J.V. Divencha alongwith Mr Muhammad Sadiq, Mr Chiragh Zameen and Mr Rizwan Ali. They did a mammoth task of verifying 27,000 transfer deeds, along with registration of transfer numbers in excess of 784,000 shares. The opening price quoted for 4.2 million government shares sold at Rupees 25.15 rupees was rupees 48 and the volume transacted on very first day was 87,000 shares.

Exploring Deeper –Goru B

The deep horizon in Mari Gas Field was never explored, however the discovery of gas at deeper horizon in 1987 by Eni of Italy in 1989 at Kadonwari south of Khairpur followed by OMV of Austria at Miano in 1993 both discoveries in Cretaceous sands acted as catalyst for Mari to explore deeper.

10 Mari News, January-March 1994.
11 Mari News, January –March 1994

Seismic survey 1995

Dynamite Seismic Survey of 200 kilometres was conducted in 1995 which confirmed presence of hydrocarbon. Based upon the seismic survey results a drillable structure in the lower Goru sands was identified, the initial assessment was that, there is a Western and Eastern structure at the Cretaceous sands each carrying a conservative reserves of around half trillion cubic feet of gas.

On the 1st of January 1997, Mari was about to reach another landmark by spudding in the deep well. The spirits and sentiments of the people were high on this perfect winter morning. The caravan of jeeps, led by Lieutenant General Ghulam Muhammad Malik (Retired), Managing Director, Mr. Abdul Rehman, General Manager and Mr. Muhammad Ali Mughal, Mari Field Manager, left the Daharki housing colony at about 9:00 a.m. They were closely followed by Mr. Moiz Ahmed, Finance Manager, Mr. Muhammad Ajmal Abbasi, Reservoir Manager, Mr. Liaquat Ali Khan, Project Development Manager, Mr. Tariq Z. Kitchlew, Corrosion Specialist, Lieutenant Colonel Abdul Waheed (retired), Manager Employees Relations, Colonel Amjad Javed (retired), Chief Coordinator and Mr. Khurram Khan, Company Secretary. The destination, about 20 Kilometres from Daharki colony and 11 kilometres South West of central manifold, was marked as Mari Deep -1 Well location. The Managing Director and his associates were warmly welcomed by the confident Drilling Superintendent Mr. Ghafoor Kausar and the energetic duty engineers including Mr. Ashiq Ali Chaudhary, Mr. Javed Iqbal Jadoon, and Mr. Ayub Khan. After the opening ceremony and collective praying for successful completion of the latest venture, the sacrificial goats were slaughtered at the foot of the rig.

The entire team was then escorted up to the derrick floor where they were greeted by the French Crew. Managing Director pulled the drilling brake, the rotary table moved with a thunderous jerk and the whole drilling operation suddenly came to life. This may have been a routine exercise for the old hands, but the deafening noise and knee rattling vibrations at the derrick floor was a rather scary experience for the first timers.

Lieutenant General Ghulam Muhammad, Joined Pakistan Military Academy in 1957 and was commissioned in 1960 from Royal Military Academy Sandhurst with a Queen's Gold Medal. He remained Commandant Pakistan Military Academy , Adjutant General and commanded a Corps. He was decorated with Hilal-e-Imtiaz (Military) Sitara-e-Imtiaz and Sitara-e-Basalat (Bar). Known for his punctuality of time and adherence to the traditions. He took charge as managing director on 1st February 1996.

Lt Gen (Retd) Ghulam Muhammad Malik 1996-1999

Following the spudding of the well the excitement subsided for a while as the routine operations of daily drilling, logging and testing came into effect. Steadfastly the drilling continued to the prognosed depth of 13500 feet. Following the completion of the final drilling and logging operations a few zones in the Chiltan and one in Sui Main Limestone were selected for drill stem testing.

Mari Deep Well No.1 was completed on 12 July 1997, with a total depth of 13,505 feet. Encouraged by the results of the well, Mari decided to drill a second deep well nine Kilometres north east of the first deep well. The well was spud on 28th October 1997 with a planned depth of 12,800 feet and was completed in February 1998. Under the appraisal programme, six additional deep wells were drilled; four of these deep wells turned out to be gas producers and other two wells went dry. M/s Petresim of USA carried out detail reservoir study and revealed gas reserves of 1.861 TCF. Owing to the quality of gas, the gas from deep wells was dedicated for power sector

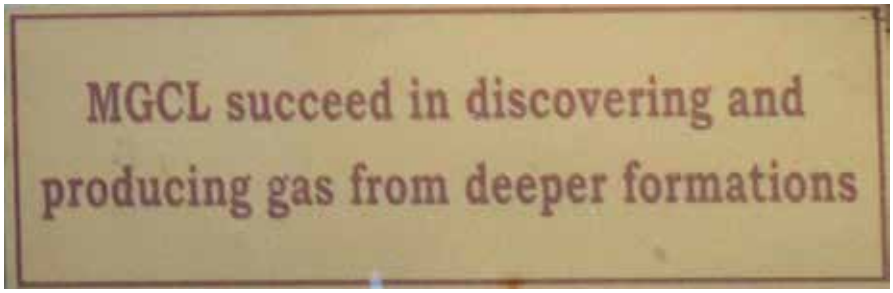
With the discovery of gas in the deeper horizon. Mari also finalized the arrangements to conduct a 440 line kilometre 2D seismic survey as a prelude to the development of Goru B reservoir.[12]

Mari's Decade of Exploration & Discovery.2000-12

New millennium was the biggest event of the century; everyone felt a new vigour and sense of achievement to be part of this passing phase of history. Collectively the rise and progress of human civilisation is a matter of pride, it is a unanimous conclusion that this rise is more pronounce in the last two centuries and is synonymous with the exploration of hydrocarbons. The new millennium brought new hope and energy for the Mari and its 316 employees, eleven more than the previous year. With the

12 https://www.dawn.com/news/84705 Dawn Newspaper, March 02,2003. Also see https://propakistani.pk/2017/11/15/mari-petroleum-makes-significant-gas-discovery-sindh/ Business Recorder Karachi, https://fp.brecorder.com/2011/06/2011061412016 02/ http://www.pakistaneconomist.com/issue2003/issue13/etc6.php

Lieutenant General (Retired) Ghulam Malik in centre - Deep Exploration

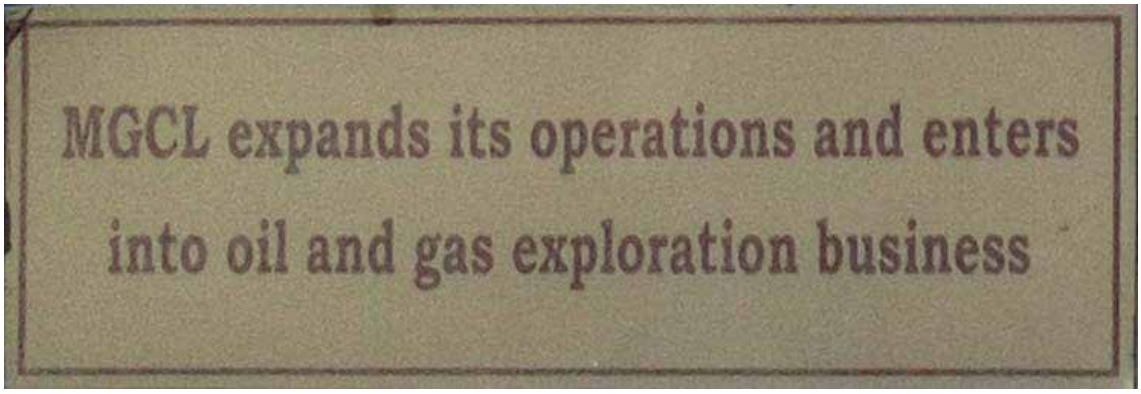


passage of time Mari had become more of a family for most of them, life and job both were rewarding and satisfying. MPCL had successfully displayed to its shareholders and stakeholders that it is one of the most reliable and profitable E&P company in Pakistan. It had ventured successfully deep beyond Habib Rahi formation into Goru-B to retain the trust of the nation in ensuring continuous supply of natural gas for fertilizer and power plants. At the dawn of new millennium Mari was eager to go deeper and to explore new frontiers.

Following the footsteps of his illustrious father late Maj. Gen. Muhammad Nawaz Mallik (Retd). Khalid Nawaz was commissioned in 1964. He was awarded Hillal-e-Imtiaz (Military) a thorough professional and a keen student of military history.

Lt Gen (Retd)
Khalid Nawaz Malik
1999-2001

The four hundred kilometres seismic survey initiated in 1999, in relation with the Goru-B discovery, indicated some additional extension of the reservoir at the South-East end beyond the boundary of the D&P Lease area. The hypothesis was exciting, thus first a Reconnaissance Permit was obtained from the government. The reconnaissance validated the survey, thus Mari applied for and was granted additional 246 square kilometres of land to its already held 969.27 square kilometres of land. This survey indicated some additional extension of the reservoir at the South-East end beyond the boundary of the D&P Lease area. Water Bath Line heater,[13] a technology, was first time introduced installed and commissioned by MGCL at their Deep Well facilities. Six deep appraisal wells were drilled, four of the six wells drilled were gas producers.



In 2001, which is now regarded as a milestone year in Mari's history, Government of Pakistan allowed exploration expenditure of up to 20 Million US$ per year; Mari therefore transitioned truly into an exploration and production company (E&P). Thus Mari in 2001 raised an exploration department, with five geologists and three geophysicists. As a strategy, the explorers decided to work on a regional scale, thus regional geological and geophysical data was purchased and integrated.

13 These line heaters designed to boost-up temperature of gas up to 140° F at different gas flow rates

Gas pipelines being hauled during Phase VI

Till 2005, fourteen applications for operatorship, 23 areas to farm-in as a joint venture partnership and 26 blocks for farm-in were reviewed. By the end of 2005, Mari had ventured outside the Mari Development and Production Lease area for the first time in its history when it acquired operator exploratory license of Karak and Noor Blocks. It also acquired 60% in Ziarat and 35 % share in Bolan exploratory licenses; as operator and partner. Mari had also entered as joint venture partner(J.V.Partner) in nine other exploratory licenses including Dadhar, Nawabshah, Hala, Zamurdan, Kohlu, Kalchas, Kot Sarang , Pasni and Makran; last two being offshore licenses.[14]

Expansion

An important and much needed requisite for expansion was the rehabilitation of the gas pipelines. By 2001, these pipes had completed 35 years of service; more than anything else it was a matter of safety of the pipelines. A, C-scan survey was conducted to ascertain the condition of wrapping and coating, based upon this the first phase of the rehabilitation of pipelines was initiated in

Lt Gen (Retd) Khalid Nawaz Malik on his farewell

14 Mari Gas Company Limited(MGCL) *Annual Reports for the Year 2004, 2005, 2006.*

July 2001. By the end of 2004, over ninety thousand feet of pipeline was rehabilitated. Pigging was required on certain wells flow lines due to high water production, pig launching and receiving facility was constructed at well No.11.[15]The whole operation was designed, fabricated and commissioned through in-house expertise; existing material in Pipri warehouse was used and no new material was procured. In the same breath, the warehouse at Pipri was also upgraded.[16]

Was commissioned in September 1965. He has the honour of having served with the elite troops of Special Services Group of the Pakistan Army. He was awarded the Hilal-e-Imtiaz (Military), Sitara-e-Jurrat and Sitara-e-Basalat; the last two being gallantry awards. During his 38 years career in Pakistan Army, he had the honour to be Chief of Logistics Staff, Corps Commander, Commandant Pakistan Military Academy, Director General Pakistan Rangers and Commander United Nations Force Somalia (UNOSOM).

Lt Gen (Retd)
Muhammad Afzal Janjua
2002-2005

Coinciding with the new millennium and newly approved financial freedom for exploration, Mari initiated its **Phase VI** development for Habib Rahi Reservoir in order to enhance its production from 459 to 495 MMSCF;

An artistic impression of Lt Gen (Retd) Afzal Janjua during Phase VI

15 Well No.12,48 and 73
16 Mari News, Volume No.1 Issue No.1 June-December 2004.

An artistic impression of Lt Gen Afzal Janjua (second from left) during Annual General Meeting

seventeen wells had to be dug apart from hooking two deep wells .[17] An expansion programme is much debated and thoroughly planned down to the minutest detail, just to highlight this point, no less than 25,000 gallons of fresh water is required daily for the drilling of one well. Thus there are pre–spud preparations which includes topographical survey, acquisition and demarcation of land, preparation of location which in this phase included preparation of over 50 kilometres of track amidst sand dunes for heavy traffic including Mari Rig. Crew of Mari Rig deserves applause for their untiring, focused, professional and dedication; they rewrote the history and set new record for speedy drilling. Rig was in fact zigzagged through cultivated land, sand dunes and water logged area; they were able to complete move in unprecedented 10-12 hours. Drilling requires a constant and heavy flow of spares and related material, 'in a single day eighty trailers of tubular were unloaded'. Drilling Phase started with drilling at Well No.90, ' after the first fast in, the rig and its crew never looked back'[18] . Well No.86 was the last well to be drilled.

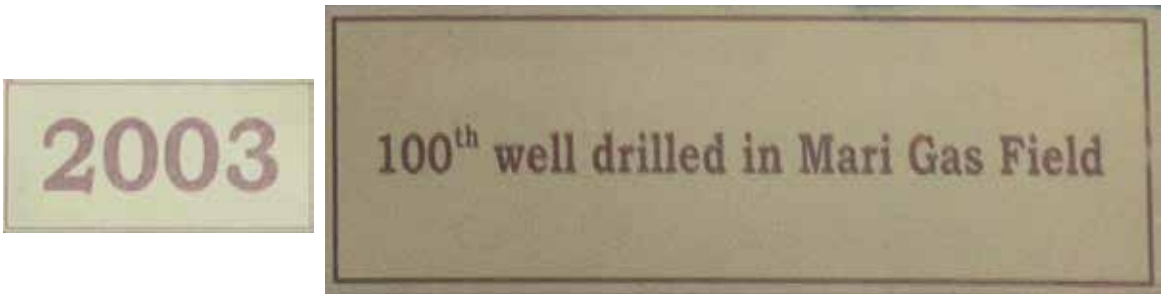
Laying of gathering system and fabrication of well site facilities were the culminating act of this expansion project. No less than 1, 46,000 feet of pipe lines ranging in diameter from six to sixteen inches were laid; later they all were hydrostatically tested. The Achilles Heel of the expansion regime in the end was the high percentage of carbon dioxide in these eighteen wells; it was higher than the permissible 'MGCL could not have attained the maximum production capacity owing to the high percentage'.[19] This Gordon Knot was broken by Mari's own expertise, equipment and human resource. Modification was carried in gathering network thus shifting high carbon dioxide content gas after

17 Mari Deep 10 and 11 in Habib Rahi Reservoir had to hooked up with the gathering system
18 Ashiq Choudhry, Captain (retired) Riffat Hussain *Phase VI Development Project* Mari News, June 2004.
19 Permissible limit is 10 %

The Pasni X-2 exploration well was spud in February 2005.

taking into consideration the behaviour of each well from Manifold No.1 to No.2 and vice versa. *'The job accomplished , not only created enormous operational flexibility but also enabled us to implement the production plan in its true spirit.'*[20]

Discovery



Exploration is mixed bag of fortune and misfortunes, success and failure, hope and despair, joy and sorrow; and Mari is no exception. The Pasni X-2 exploration well was spud in February 2005. By September same year, drilling having encountered various unexpected problems and bad sea weather conditions managed to reach the depth of 4,000 meters but the target sandstone reservoir was not present. Since the well proved unsuccessful, it was thus plugged and abandoned. Zarghun on the other end is a success story, Mari was able to discover not only gas but also oil for the first time

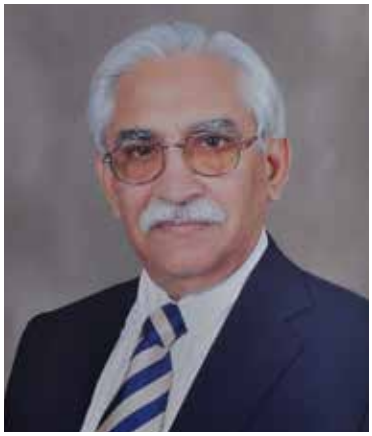
20 Ashiq Choudhry, Ayub Khan *Mari News.* December 2004.

Lt Gen Afzal Janjua (standing) on his farewell

In 2005, Mari made another gas discovery in its lease area in Sui and Pirkoh Limestone formations. The well was spudded on February 16, 2005 and drilled down to 1,268 meters within a record period of 16 days. Gas discovery in Pirkoh Limestone was one of the shallowest and first ever discovery in this formation. Extended well testing was conducted for the duration of forty days and average production of well was six MMSCFD from Sui Main Limestone and 2.5 MMSCFD from Pirkoh Limestone. [21]

Drilling, completion and hook up of three Pirkoh Wells and three prospects at Pirkoh Limestone reservoir were identified. After necessary

Lieutenant General Imtiaz Shaheen Hilal –e-Imtiaz (military). He took was appointed Managing Director of Mari Gas Company on 11th February 2005. He was commandant Pakistan Military Academy, Director General Pakistan Rangers, and later commanded a corps . He has the distinction of being the first commander of U.N Peace Keeping in Somalia in 1992. He also has been delivering lectures on the role of UN as peacekeepers internationally.

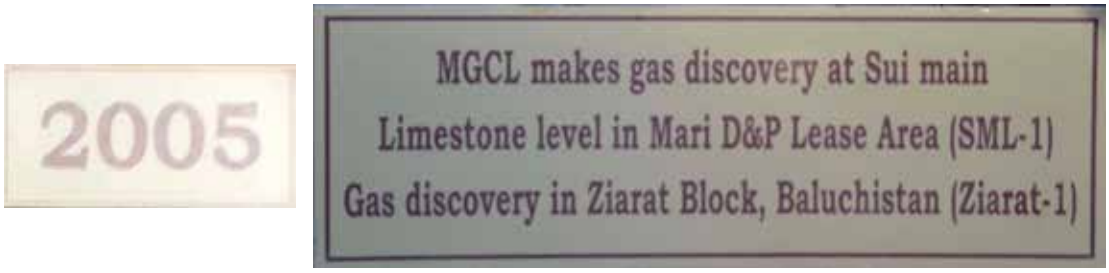


Lt Gen (Retd)
Imtiaz Shaheen
2005-2008

21 https://innspub.net/jbes/sedimentology-pir-koh-formation-exposed-dholi-rakhi-gaj-central-sulaiman-range-pakistan/

An artistic impression of Lt Gen Imtiaz Shaheen in China

planning and arrangement of services, drilling of well MG(P)-1, MP-1 and MPX-1 commenced on May 12, 2013 and successfully completed on July 02, 2013 by using Mari's own Skytop Brewster Rig and crew. Successful Drill Stems Test (DST) by perforating Pirkoh Limestone was carried out, which


2005
MGCL makes gas discovery at Sui main
Limestone level in Mari D&P Lease Area (SML-1)
Gas discovery in Ziarat Block, Baluchistan (Ziarat-1)

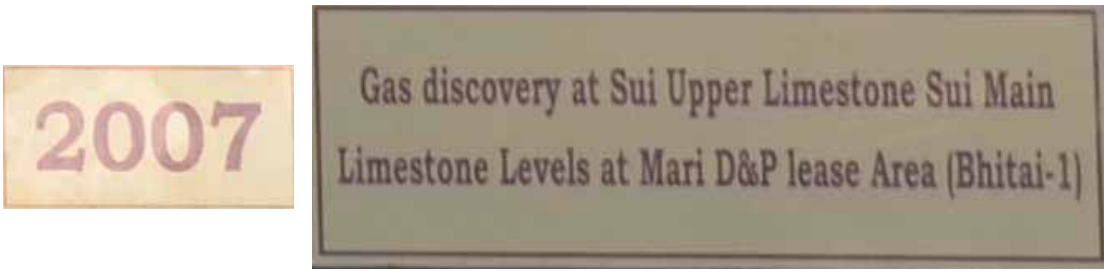
resulted in gas flow from all the three wells. These wells were hooked up with existing gas gathering network at Mari D&P. The cumulative production from the said discoveries to national grid system was approximately 6 MMSCFD. After strenuous efforts, Mari was able to hook up well # 85 with the gas gathering network after twenty seven years. The well was drilled in 1986 but the gas could not be tapped due to certain unavoidable circumstances. The well later contributed 9 MMSCF gas per day.

Sui Main Limestone (SML)

Previously, there was a perception that SML reservoir quality deteriorates from Qadirpur Gas Field to Mari D&P Lease area. This perception was changed when well data within and around Mari D&P Lease area were reviewed. As a result of the comprehensive study, a prospective area was identified

Lt Gen Imtiaz Shaheen shaking farewell hands

at SML and PKL levels in the western part of the Mari D&P Lease based on the vintage seismic data interpretation. All the wells over the identified prospective area were drilled down to Habib Rahi Limestone at shallower level except Mari Deep Well # 6. Mari SML Well -1 was spudded on February 16, 2005 and reached total depth of 1,268 meters in Ranikot Formation of Paleocene age within a short span of eighteen days. Considering the encouraging log results, three zones that are Pirkoh, Sui Upper



and Sui Main Limestones were tested, which flowed gas at a cumulative rate of around 6 MMSCF per day. This significant discovery supplements Mari's existing producible reserves in Habib Rahi Limestone and the proven reserves of Lower Goru "B" Sands.

All these efforts and studies finally bore fruit when on 21st June 2006 , Government of Pakistan awarded the Petroleum Exploration Licenses for Sujawal , Hanna and Harnai blocks to Mari as

Lt Gen (Retd) Mushtaq Hussain

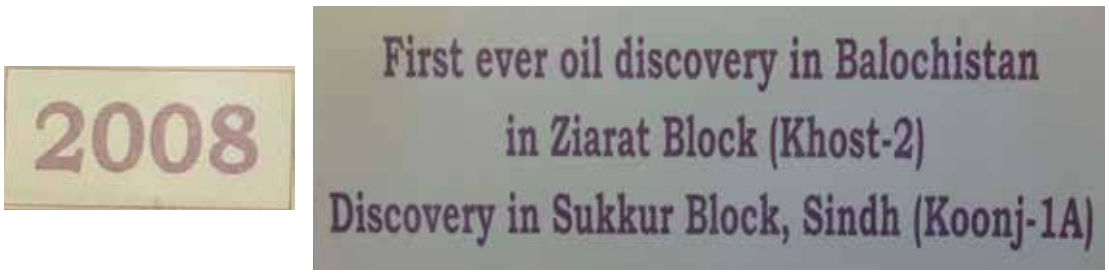
operator with full working interest; Mari planned to invest approximately US $ 208 million in the next five years. Purchase of Rig from China in 2007 was the next major step and it was not the last rig to be purchased as another one, even more powerful was added to the inventory soon.

Unfortunately, mid of new decade was also the end of the classic era of exploration in Pakistan. The aftermath of the US War on Terror emerged in Pakistan as a new form of terrorism and armed radicalism. In Baluchistan, it started at the end of 2004 in the Gwadar area and soon spread into Bugti and Marri tribal territory which is heart of natural gas in Pakistan. In KPK, it had practically ceased the exploration of oil and gas. Punjab and Sindh remained relatively calm but there was the ever present fear of installations and teams being targeted by terrorists. Mari Gas Company in its last year before it transitioned into Mari Petroleum Company Limited had become

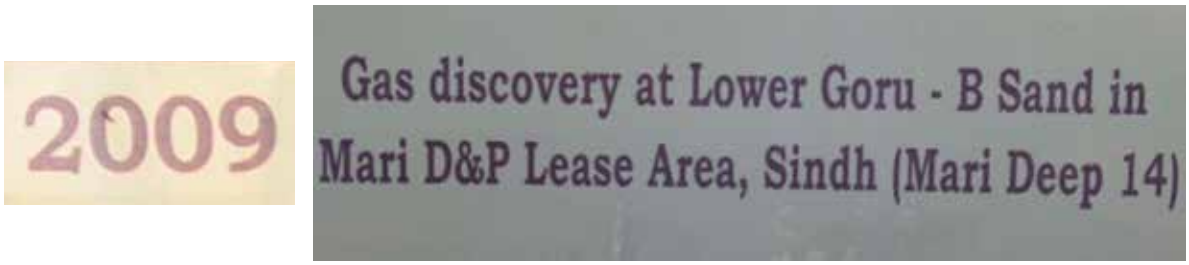
Lieutenant General Mushtaq Hussain, HI(M) (Retd), took charge as Managing Director and Chief Executive of Mari Gas Company Limited on 11 February 2008. He got commission in Pakistan Army in July 1966 in an Infantry Battalion (4 Frontier Force Regiment).

Lt Gen (Retd)
Mushtaq Hussain
2008-2011

Farm out agreement with Hungarian Oil and Gas Company on 2 July 2008



the third largest among the twenty five odd explorations and production (E&P) companies operating in Pakistan.



2010	1st gas condensate discovery in Sujawal Block, Sindh (Sujawal-1)
2011	1st oil discovery in Karak Block, Punjab (Halini-1)

MARIB PETROLEUM COMPANY LIMITED
MPCL

OPERATED BLOCKS : 09

1. PESHAWAR EAST BLOCK (3371-16)
2. GHAURI BLOCK (3273-3)
3. BANNU WEST BLOCK (3370-13)
4. KARAK BLOCK (3271-1)
5. HARNAI BLOCK (3067-3)
6. ZIARAT BLOCK (2967-2)
7. BLOCK-28
8. SUKKUR BLOCK (2768-9)
9. SUJAWAL BLOCK (2467-11)

NON-OPERATED BLOCKS : 06

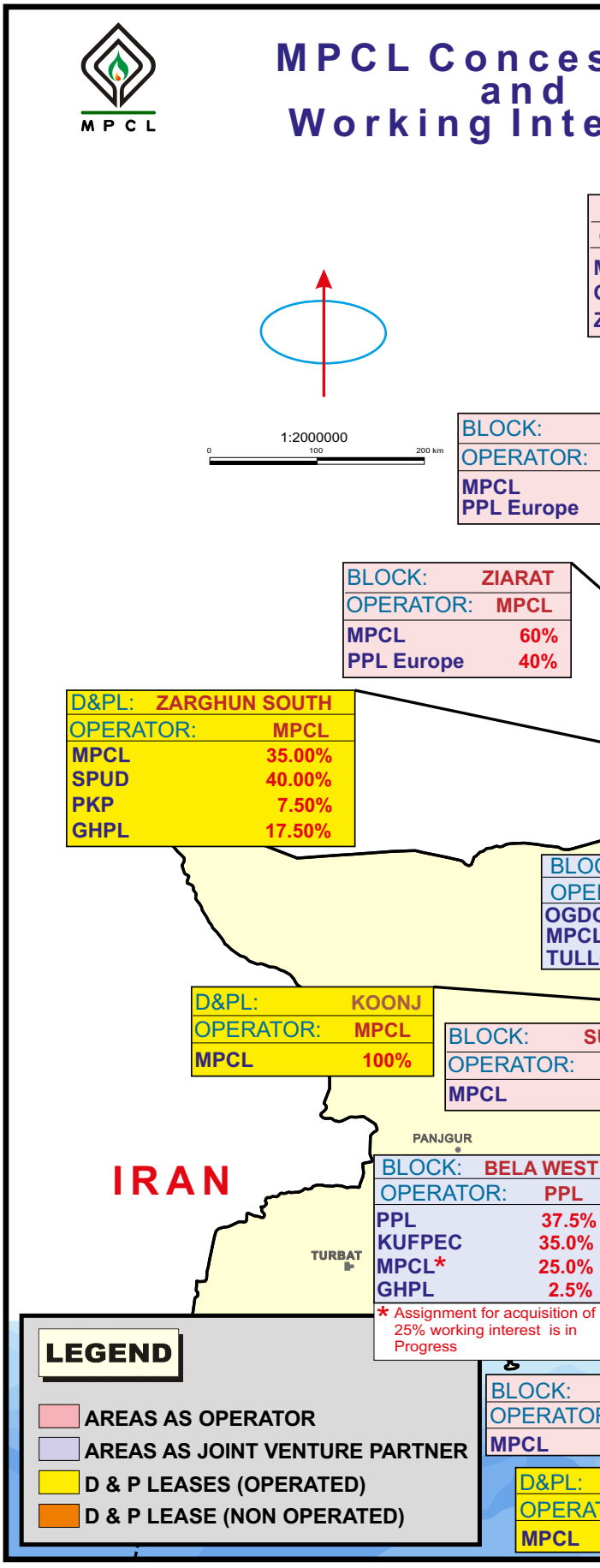
1. KOHAT BLOCK (3371-10)
2. KOHLU BLOCK (2968-3)
3. KALCHAS BLOCK (2969-7)
4. HALA BLOCK (2568-13)
5. BELA WEST BLOCK (2566-6)
6. SHAH BANDAR BLOCK (2467-16)

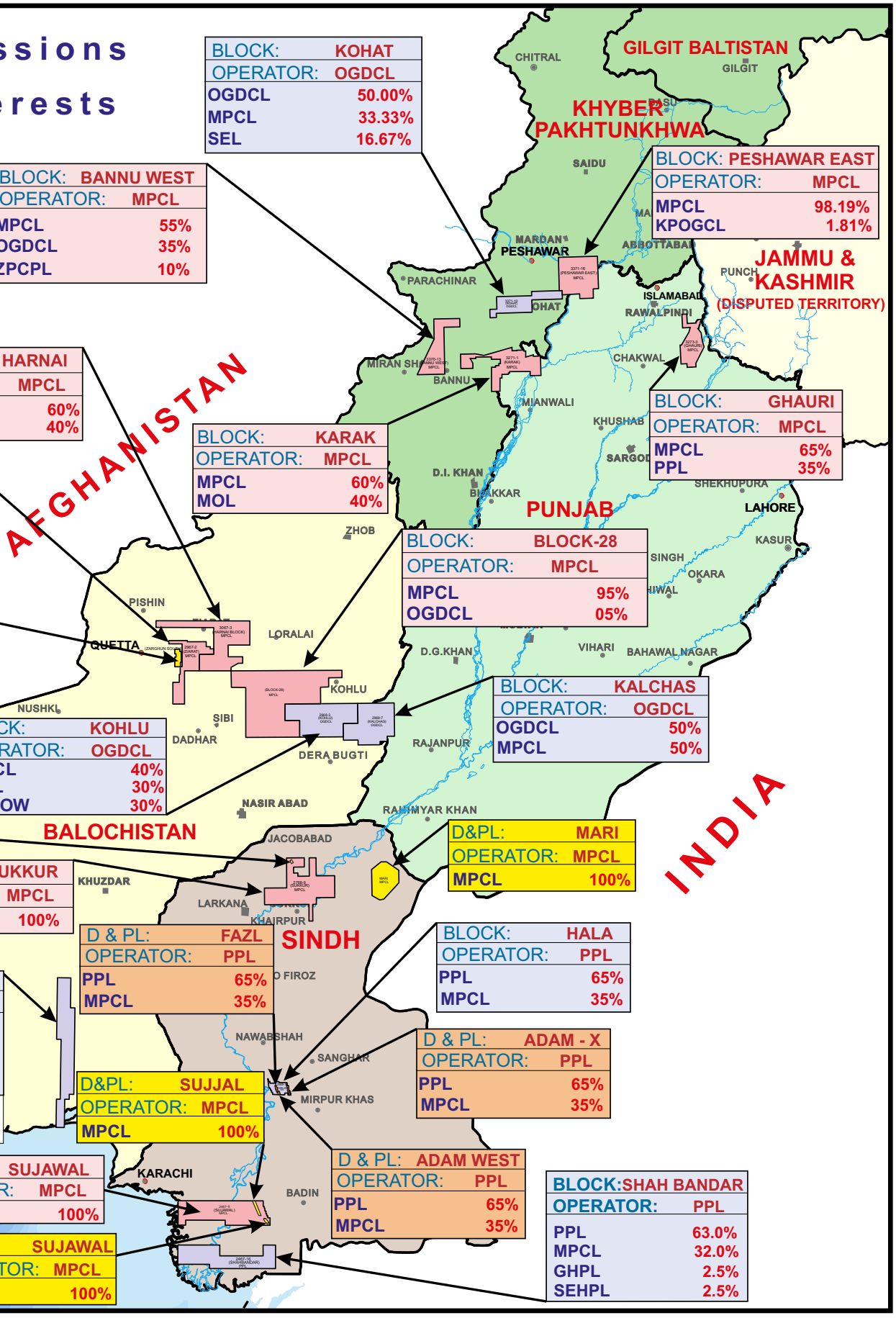
D & P LEASES (OPERATED) : 05

1. ZARGHUN SOUTH
2. MARI
3. KOONJ
4. SUJJAL
5. SUJAWAL

D & P LEASES (NON OPERATED): 03

1. ADAM - X
2. FAZL
3. ADAM WEST





As of January 2019

2012

Change of Company Name & Logo

Over the years, the Company had expanded its scope of business from the production and sale of natural gas from a single field, to the exploration, production, and sale of gas, oil and other petroleum products in various concession areas. It was therefore felt expedient that the name and logo of the Company be changed to reflect the expanded scope of its business. The Company got its new name i.e. Mari Petroleum Company Limited and a new logo in November 2012. With this new identity, the Company remains committed as ever in pursuits of fulfilling its responsibilities towards all its stakeholders. it is hoped that the Company will prosper and achieve new heights under its new identity.

This represents an Oil Drop in standard API green colour

The orange flame represents flame of gas

This line represents Green Colour of Pakistan Flag

MPCL

Mari Petroleum Company Limited

Chapter IV

Mari Petroleum Company Limited

November 12th, 2012 is a remarkable day in the history of Mari when Mari Gas Company became Mari Petroleum Company Limited with Lieutenant General retired Raza Muhammad Khan as its first managing director. The decision to have a new identity itself was much debated and deliberated upon in the company, as change of name can be an economic marvel or a corporate suicide. The corporate identity of Mari ~~Gas~~ has been engraved and etched in the common and corporate mind, Mari is synonymous with the highest social and ethical values prevalent in the oil & gas sector today; these social and ethical values have been nurtured and instilled in Mari for over five decades.

Lieutenant General Raza Muhammad Khan, Hilal-e-Imtiaz was appointed as Chief Executive and Managing Director on 11th February 2011. He apart from commanding division and corps was also the President National Defence University , Islamabad. He authored quite a number of articles on International Relations and Principles of War.

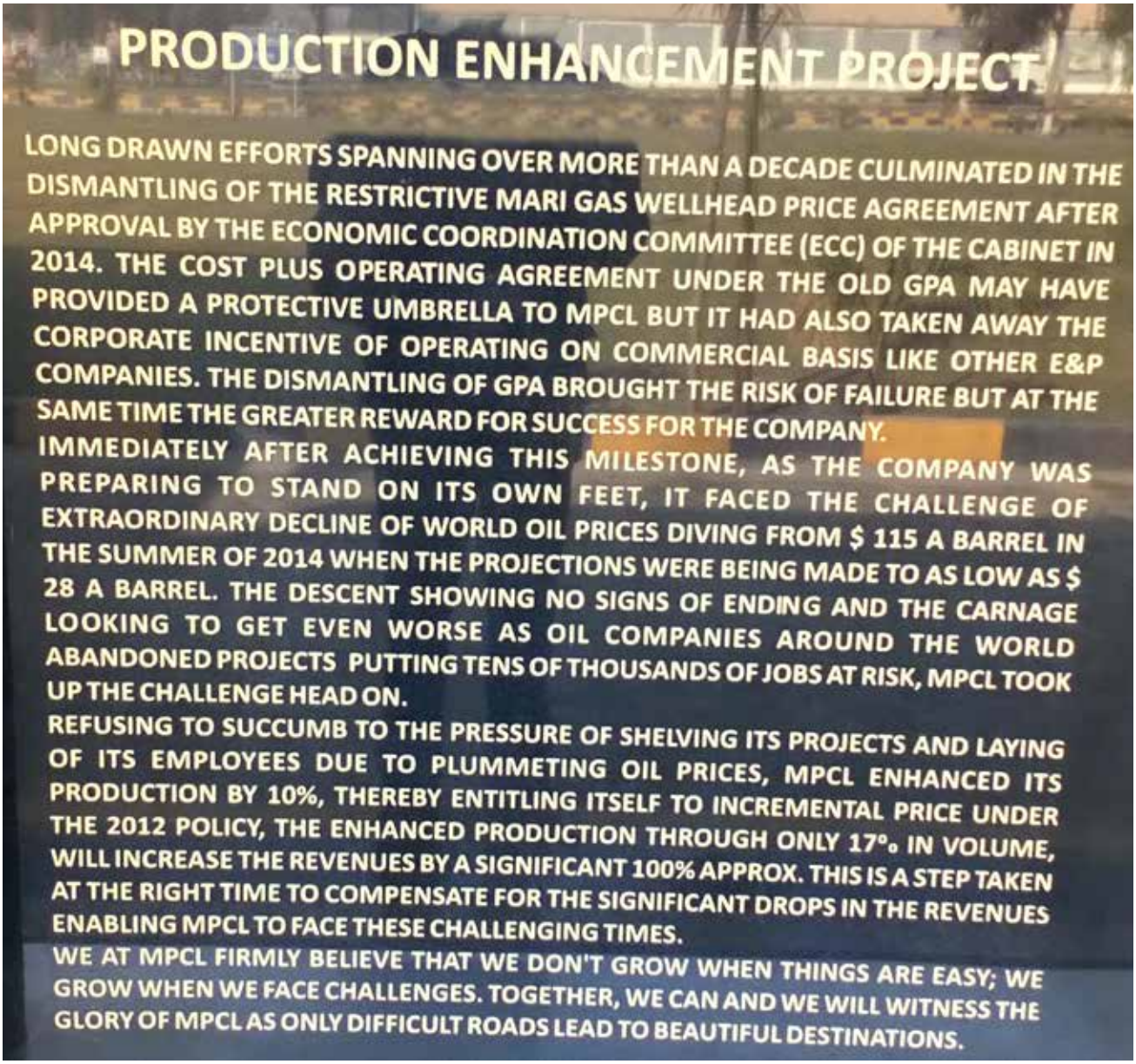
Lt Gen (Retd)
Raza Muhammad Khan
2011-2013

Another proponent of the argument was the changing environment where recent discoveries of oil and condensate in Khost and Sujawal acted as a game changer and catalyst to have a more appropriate

Lt Gen (Retd) Raza during seismic survey of Ghauri

outlook; at least etymologically. In the strict sense the word 'hydrocarbon' is more appropriate as it encompass both oil and gas. However commercially the word Petroleum has more glamour to it than Gas, although petroleum in its strict sense relates to oil or liquid. In the end it was decided that word Mari would be retained and the word gas would be replaced by petroleum. Coincidentally, with this transition in name, a new state of the art head office comprising of six storeys was also commissioned; thus transition from gas to petroleum was now completed. A new logo designed by renowned artist Miss Nargis was also adopted.

Over the past half century the petroleum industry has played a significant role in national development by making large indigenous gas discoveries. These sources are supplying gas to consumption centres through 9,843 kilometres transmission networks and 71,863 kilometres of distribution system. Pakistan meets about 15% of its oil demand from local sources. Oil and Gas are major components of Pakistan's energy mix, meeting over 79% of energy needs.


PRODUCTION ENHANCEMENT PROJECT
LONG DRAWN EFFORTS SPANNING OVER MORE THAN A DECADE CULMINATED IN THE DISMANTLING OF THE RESTRICTIVE MARI GAS WELLHEAD PRICE AGREEMENT AFTER APPROVAL BY THE ECONOMIC COORDINATION COMMITTEE (ECC) OF THE CABINET IN 2014. THE COST PLUS OPERATING AGREEMENT UNDER THE OLD GPA MAY HAVE PROVIDED A PROTECTIVE UMBRELLA TO MPCL BUT IT HAD ALSO TAKEN AWAY THE CORPORATE INCENTIVE OF OPERATING ON COMMERCIAL BASIS LIKE OTHER E&P COMPANIES. THE DISMANTLING OF GPA BROUGHT THE RISK OF FAILURE BUT AT THE SAME TIME THE GREATER REWARD FOR SUCCESS FOR THE COMPANY.
IMMEDIATELY AFTER ACHIEVING THIS MILESTONE, AS THE COMPANY WAS PREPARING TO STAND ON ITS OWN FEET, IT FACED THE CHALLENGE OF EXTRAORDINARY DECLINE OF WORLD OIL PRICES DIVING FROM $ 115 A BARREL IN THE SUMMER OF 2014 WHEN THE PROJECTIONS WERE BEING MADE TO AS LOW AS $ 28 A BARREL. THE DESCENT SHOWING NO SIGNS OF ENDING AND THE CARNAGE LOOKING TO GET EVEN WORSE AS OIL COMPANIES AROUND THE WORLD ABANDONED PROJECTS PUTTING TENS OF THOUSANDS OF JOBS AT RISK, MPCL TOOK UP THE CHALLENGE HEAD ON.
REFUSING TO SUCCUMB TO THE PRESSURE OF SHELVING ITS PROJECTS AND LAYING OF ITS EMPLOYEES DUE TO PLUMMETING OIL PRICES, MPCL ENHANCED ITS PRODUCTION BY 10%, THEREBY ENTITLING ITSELF TO INCREMENTAL PRICE UNDER THE 2012 POLICY, THE ENHANCED PRODUCTION THROUGH ONLY 17% IN VOLUME, WILL INCREASE THE REVENUES BY A SIGNIFICANT 100% APPROX. THIS IS A STEP TAKEN AT THE RIGHT TIME TO COMPENSATE FOR THE SIGNIFICANT DROPS IN THE REVENUES ENABLING MPCL TO FACE THESE CHALLENGING TIMES.
WE AT MPCL FIRMLY BELIEVE THAT WE DON'T GROW WHEN THINGS ARE EASY; WE GROW WHEN WE FACE CHALLENGES. TOGETHER, WE CAN AND WE WILL WITNESS THE GLORY OF MPCL AS ONLY DIFFICULT ROADS LEAD TO BEAUTIFUL DESTINATIONS.

In 2013, MPCL added a new 2500 HP drilling rig, state-of-the-art Mari Seismic Unit and Seismic Data Processing Center, becoming the second fully integrated E&P Company after OGDCL in the Country.

This change of nomenclature proved its merits, it brought a change in everyone's outlook from the managing director right down to the company man and tool pusher. It was a repetition of history; a similar excitement was in the air in 2001, when financial freedom in exploration was granted to Mari. In 2013, the most prominent achievements were; the formation of Mari Seismic Unit department and the acquisition and commissioning of a 2500 horsepower rig. The cumulative impact of this resulted in an unprecedented rise in the shares of Mari to Rupees. 293 on 16 August 2013. The science of Seismic Exploration is in essence based on the elastic-wave phenomenon and its applications in exploring subsurface geological structures with what they contain from minerals, water, and hydrocarbon depos-

2013

Three (3) Gas discoveries at Pirkoh Limestone Level in Mari D&P Lease Area (MGP-1, MPX-1 & MP-1)

its. The first scientist who investigated the elastic behaviour of bodies is Galileo (1564–1642), in the year (132 ~~AD~~), the Chinese philosopher Chang Heng devised a detection instrument to detect the earthquake impulse; marking the first step in instrumental seismology.[1]

On 5 December 2015, Mari Seismic Unit (MSU) carried out a successful 3D Seismic covering an area of 1,079 square kilometres; this project generated an impressive profit of Rs. 730 million. [2] This seismic data provided a new insight into the subsurface formations and led to the drilling of four wells during the year 2016-17 in SML and SUL Formations. This maiden

Lieutenant General Nadeem Ahmad, Hilal –e-Imtiaz (Military), Sitara-e-Essar, Sitara-e-Basalat, had an illustrious military career spanning over forty years. He apart from military formations also commanded Anti Narcotics Force (2003-05). He is remembered for his efforts in the rehabilitation of the people and area in the aftermath of 2005 Earth Quake. He assumed the responsibilities as Chief Executive and Managing Director on 26th February 2014.

Lt Gen (Retd)
Nadeem Ahmed
2014-2017

1 Hamad Alsadi *Seismic Hydrocarbon Exploration* (Springer Switzerland,2011).pp,2-14.
2 Mari Annual report 2016, p-40.

The NOMAD 65 Seismic Vibrator is a 276 kN (62,000 lb.Force) P-Wave vibrator mounted on a Four-Wheel Drive Articulated off-road vehicle.

- Frequency Range: 7 to 250 Hz
- Hydraulic Oil Tank: 300 Liters
- Engine Type: Caterpillar C-13, 4- Stroke
- Power: 440 HP @ 2100 RPM
- Fuel Tank: 1000 Liters
- Weight: 31,400 Kg
- Length: 10.60 meters
- Width: 3.4 meters
- Height: 3.7 meters
- Max speed: 28 km/hr

In 2014 Mari inducted NOMADS 65 Seismic Vibrator, a two member team underwent three weeks training at Nomad 65 production plant at Saint Gaudens, Toulouse, France. Initially in September 2013, Muhammad Hamid Raza (Vibrator Technician) spent three weeks at the training centre later Muhammad Umair a Mechatronics Engineer also underwent training at same center.

Lt Gen (Retd) Nadeem Ahmed (left)

success acted as a catalyst and in the next year 528 square kilometres of area in Sujawal Block was completed well in advance, by doing so the crew of MSU set a national level record of production by having 1014 shots in a single day. Main and important achievement of MSU is in carrying out work in high threat risk areas of KPK and Baluchistan. These areas are generally perceived to have high reserves of gas with high ratio of success, but majority of E&P companies avoid working in these areas due to the hostile security situation. As a result of aggressive exploration strategy, nine wells were planned for 2016-17, out of which, eight wells were drilled. Tipu-1 Exploratory Well in Mari D&P lease was spud-in on 5 July 2017 to test the hydrocarbon potential of Lower Goru B & Massive Sands, SML and Sembar Formation down to the depth of 3,950 meters.

Mari due to its longstanding tradition continued its un-interrupted gas supply to all its customers during the year 2016-17. A cumulative 231,147 MMSCF of gas at a daily average of 633 MMSCF and 16,149 bbl of condensate (44 bbl/d) were produced from Mari Field during the year. In addition, 461,771 bbl of crude oil (1,265 bbl/d), 76,161 bbl of condensate (209 bbl/d), 12,688 MMSCF of gas (35 MMSCF per day) and 20 metric ton of LPG (0.05 metric ton per day) was produced and sold from joint ventures during the year,

Mari Petroleum Company Limited (MPCL) and Polskie Górnictwo Naftowe I Gazownictwo SA (PGNiG) Polish oil & gas Exploration Company signed a MOU on 15th February 2018. The MOU for strategic cooperation was signed by Lt. Gen Ishfaq Nadeem Ahmad (Retd), MD/CEO MPCL and Mr. Przemyslaw Krogulec, MD, PGNIG at MPCL Head Office Islamabad.

Mari's customers include Engro Fertilizer, Fauji Fertilizer, Fatima Fertilizer, Foundation Power Daharki Central Power Generation, Sui Northern Gas Pipelines, Sui Southern Gas, Attock Refinery, National Refinery, Pakistan Refinery, Pak Arab Refinery , Western Power, Petrosin CNG (Private) and Foundation Gas. Mari achieved its highest ever production of 746.50 MMSCF of gas on 26 June, 2017. Average daily production from HRL reservoirs remained 573 MMSCFD during the financial year 2016-17.

Primarily, Mari is an exploration and production company in the upstream segment of the petroleum industry. Mari's mission is to enhance exploration and production by breakthroughs in knowledge and technical innovations with an aim to maximise revenues and return to the shareholders whilst maintaining highest standards of health, safety and environment. Apart from natural gas, it also produces crude oil, condensate and liquid petroleum gas, however all products of the Mari are generic and supplied to downstream customers without any brand name.

Mari is a transparent company where all financial transactions are accurately reflected in the annual reports and Mari has won many national awards on its annual report. Mari as a principle and policy remains aloof of the politics , **'Company shall not make payments or other contributions to political parties and organisations.** Oil and gas industry by nature is a risky business as it is

Prime Minister Shahid Khaqan Abbassi 22nd January 2018 at Mari Headquarters

subject to international geopolitics with a resultant swing in oil prices as happened in 2015; thus diversification in associated activities offers to lessen the risk. Mari is now entering into the Mari X development project to extend the plateau period of Habib Rahi Limestone reservoir. By end of August 2018, three new wells out of planned 19 wells had been drilled and connected into the system.

Mari Gas Field alone generates 95 % of the company's production and generate 89% of its revenues. It is the greatest source of income for MPCL as well as its Achilles Heel. To counter the overall dependence on a single field which is naturally bound to deplete with passage of time, Mari has increased its budget of exploration from USD $ 249M to USD$ 371M.

The 22nd of January 2018, is a historic day as Honourable Prime Minster Shahid Khaqan Abbassi visited Mari Headquarters, becoming the first ever Prime Minister of Pakistan to be a guest at Mari. He came to attend a presentation given by PPEPCA. In eighties the leading oil and gas companies in Pakistan including Mari made an effort to have a joint and uniform forum to debate over the oil and gas exploration and production related issues. In 1988 it was originally conceived under the name and style of Pakistan Exploration and Production Companies Advisory Committee (PEPCAC) as a representative body of local and foreign companies engaged in exploration and production of petroleum. Its establishment is an important landmark in the history of petroleum industry of Pakistan. PPEPCA was the culmination of endeavours, spread over a long period, of five private sector companies namely; Mari Gas, Oxy, POL, PPL, UTP and OGDCL a public sector company. In May 1995, the organization

was converted into a company, limited by guarantee, without any share capital, through the blessing of Ministry of Petroleum & Natural Resources under the new title of 'Pakistan Petroleum Exploration and Production Companies Association.[3]

2018 is a landmark year in many other aspects apart from the prime minister's maiden visit , Mari successfully negotiated with other E&P companies to acquire working interests in Bannu West, Block-28, Kalchas, Kohat, Ghauri, Bela West and Sukkur Blocks. In September 2018, Mari made a landmark crude oil discovery in Ziarat Block near Quetta. The important aspect of this discovery is that this is the first ever oil discovery in Chiltan and Moro/MughalKot formations in Balochistan Province. Mari discovered substantial new gas reserves at exploratory well Tipu-1, unlocked upside potential at Bhittai-5 appraisal well and also completed Azadi-1 development well, all in Mari D&P lease area. For financial year 2017-18, Mari paid highest ever dividend of 60%. In addition to the handsome dividend, it also issued 10% Bonus Shares to its shareholders. No wonder ~~then~~ that Mari enjoys unprecedented confidence of the investors with highest share price in listed petroleum companies from all streams and current market capitalization of over Rupees. 160 Billion. Plimsoll, a UK based leading analyst firm, has recently issued their latest report containing the financial analysis of 330 companies of the world based on their published annual accounts. They have ranked Mari as 29th most profitable Company.

Mari and KUFPEC. Lt. Gen Ishfaq Nadeem Ahmad (Retd) and Mr. Ayyad Alkandari. 16th February 2018. Mari Headquarters

3 Official web site of PPEPCA https://www.ppepca.com/aboutppepca.html

HE Maj Gen Ashimiyn Adabayo Oblaniyi. Ambassador of Nigeria visited Mari Headquarters on 1st October 2018

Due to the security concerns few international E&P companies like OMV left the arena, whereas Eni, MOL, KUFPEC continue to operate. Mari has been making efforts to be a vanguard in the initiation of much needed exploration in the once troubled frontier political agencies. In the larger national interest, despite security and terrain related challenges, Mari aggressively undertook 3D seismic data acquisition in North Waziristan area of FATA with a plan to drill an exploratory well by end of 2019. Preparations are also underway to start work in Block-28 in Balochistan, where activities are on halt since long due to security reasons.

Mari- 2019 and Beyond.

3 January 2019, a Historic Day

Thursday 3 January 2019 stands out as a historic and memorable day in the history of Mari Petroleum Company Limited, Chief of Army Staff General Qamar Javed Bajwa Nishan-e-Imtiaz (Military) Hilal-e-Imtiaz (Military) visited Mari's headquarters, it is the first ever visit of an army chief in the history of company. On arrival he was received by the Managing Director Lieutenant General (retired) Ishfaq Nadeem and was given a detailed briefing. General Bajwa was apprised on the magnificent growth that Mari has attained over the decades, '*We are now a Billion Dollar company , having second largest gas reserves in Pakistan, with 130 producing wells . The role of Mari in ensuring the food*

security of the country was also highlighted , the fact that nineteen new wells are being drilled is a testimony to the efforts. MD with pride informed that Mari has been declared the best company in corporate sector for last three years in succession. MD also highlighted the contribution Mari is making in improving the quality of life in the area of operations in which so far over 1.3 Billion rupees have been spent so far on the health and education.'

General Qamar Bajwa listened with keen interest and appreciated the efforts and contributions of Mari towards national economy especially its plans for diversifying ~~the~~ business and for contributing back to the country. He acclaimed the leadership of Mari and its team for their unremitting and persistent efforts to meet the energy and food security challenges of Pakistan by providing uninterrupted gas supply in last five decades. General Qamar Bajwa hails from a Jat family in Ghakkar and as such is very familiar with the impact of fertilizers in improving the everyday life of farmers. He also shared his memories when the fertilizers were first introduced in the agriculture and how farmers were reluctant to use it and now the perspective has change and at present without fertilizers the farmer is handicapped.

In 2019, Mari is managing the largest gas reserves of Pakistan at Daharki in Sindh, currently having 18% share of total natural gas in Pakistan. The current production is equivalent to115, 505, 000 bbl/d. Mari's exploration success rate is 70% which is the highest amongst all companies working in the Pakistan, whereas the average industry success rate is around 33%. At present, there are 29 E&P companies in country amongst which 11 are local.[4] Mari also has the lowest operational cost of 10% of its gross sales. Mari is listed on Pakistan Stock Exchange with a market capital of around 170 Billion Rupees (1.2 US $ Billion). On 30 January 2018, the highest ever output of 770 million gas cubic feet was achieved and throughout the year a daily average of 713 million cubic feet was maintained. This enabled Mari to post an increase in profit after paying taxes of 68.28%(Rs. 15.4 Billions). Mari crossed the Rs. 100 Billion mark in that year and shareholders dividend increased to 60 %.

Daily Morning Mail, Wednesday, January 16, 2019

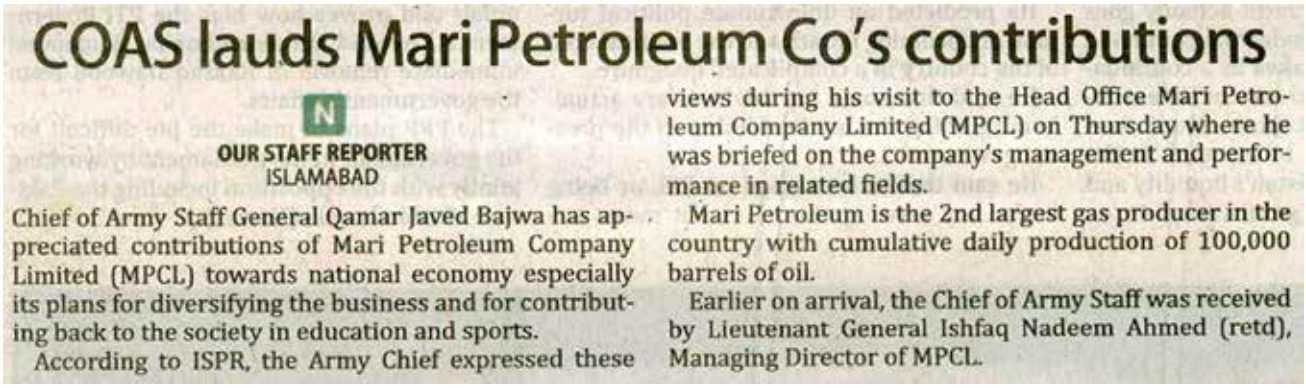
Mari Petroleum ranked 29th most profitable company of world

Wednesday January 16, 2019 | Pakistan OBSERVER

Plimsoll rates MPCL as 29th most profitable company

Effective management of risks is a fundamental component of good corporate governance and is vital for the Mari's continued growth and success. Mari in 2018-19 hired the services of I-Risk Group, a UK based International Risk Consultancy Firm to review existing risk management practices, and impart necessary trainings to its staff. The consultants have completed their assignment and the Project is now in implementation phase in the light of improvement road map agreed with the consultants.

4 Mari Petroleum Company Annual report 2018.



COAS lauds Mari Petroleum Co's contributions

N

OUR STAFF REPORTER
ISLAMABAD

Chief of Army Staff General Qamar Javed Bajwa has appreciated contributions of Mari Petroleum Company Limited (MPCL) towards national economy especially its plans for diversifying the business and for contributing back to the society in education and sports.

According to ISPR, the Army Chief expressed these views during his visit to the Head Office Mari Petroleum Company Limited (MPCL) on Thursday where he was briefed on the company's management and performance in related fields.

Mari Petroleum is the 2nd largest gas producer in the country with cumulative daily production of 100,000 barrels of oil.

Earlier on arrival, the Chief of Army Staff was received by Lieutenant General Ishfaq Nadeem Ahmed (retd), Managing Director of MPCL.

Mari is now looking at international market ~~field~~, ~~in~~ Exploration and Production, it has signed memorandum of understanding with MOL Group of Hungry, Kuwait Foreign Petroleum Exploration Company and Polish Oil and Gas Company. The American IPR Energy Resources and Tullow have shown interest in bidding jointly with Mari for certain international blocks.

Mari continues to play a pivotal role in ensuring the food and energy security of the Country. Not only is the gas supplied from Mari Field ~~is~~ utilized for producing more than 80% urea in the Country, but cumulative daily production of around 100,000 barrels of oil equivalent helps Government save precious foreign exchange worth billions of rupees every year. In this regard, the importance and critical role of Mari Gas Field cannot be over-emphasized. Mari Field has had uninterrupted production for over 50 years. The production was projected to start declining from 2019 onwards. To avert such a situation, immediate intervention was needed. Mari undertook an exhaustive in-house reservoir simulation study, and came up with a plan to drill additional development wells, along with undertaking debottlenecking and up gradation of gathering and production facilities at a substantial investment of **US$ 100 million**. Successful completion of this project would extend Mari production plateau by an additional 4-5 years, so far 13 out of 19 wells have been completed, and the results are in line with forecasts.

Mari Petroleum Company Limited (MPCL) is presently operating seven (07) oil & gas/condensate fields which are Mari Field, Daharki, Zarghun Gas & Condensate Field, Sujawal Gas & Condensate Field, Koonj Gas field, Ghauri Oil Field, Halini Oil Field and Kalabagh Gas & Condensate Field in all four provinces of Pakistan. Daily gas production of MPCL from its operated fields stands at around 680 MMSCFD of gas & 2400 Bbls of oil/condensate per day.[5]

Mari Petroleum takes great pride in its successful operations spread across the country, and for being the operator of the country's largest gas reservoir in terms of balance reserves of 5.1 TCF at Mari Field, Daharki. With the highest exploration success rate of around 70%, Mari have been providing uninterrupted gas supply from Mari Field for over five decades. Due to efficient operating methodology and proficient management, for the first time in the history of the company, Gross Sales exceeded Rupees. 100 billion mark during the recently concluded financial year. Profit-After-Tax also recorded a substantial increase of 68%, jumping from Rupees. 9 billion to Rupees. 15 billion. Mari also main-

5 http://fauji.org.pk/test/mari-petroleum-company-limited

Lieutenant General (R) Ishfaq Nadeem Ahmad
Hilal-e-Imtiaz (Military)
Managing Director Mari Petroleum Company

General Qamar Javed Bajwa
Nishan-e-Imtiaz (Military), Hilal-e-Imtiaz (Military, Legion of Merit (Turkey) Order of the Military Merit (Jordan), Chief of the Army Staff

MARI PETROLEUM COMPANY LIMITED
MPCL

General Qamar Javed Bajwa Chief of Army Staff with the Managing Director & the Senior Management of Mari Petroleum 5th January 2019 at Mari Headquarters, Islamabad. This is the first ever visit of an Army Chief to Mari Headquarters.

His Excellency Dr. Mahathir bin Mohamad, Prime Minister of Malaysia awarding trophy to Mari

tained its distinction of being the most cost effective E&P Company in the country, with operating expenses at less than 10% of the gross sales, and the lowest cost per barrel of production. At Mari, whatever is done is as much dictated by National Interests as by commercial considerations.

Mari is now looking at international market ~~field~~, ~~in~~ Exploration and Production, it has signed memorandum of understanding with MOL Group of Hungry, Kuwait Foreign Petroleum Exploration Company and Polish Oil and Gas Company. The American IPR Energy Resources and Tullow have shown interest in bidding jointly with Mari for certain international blocks.

Laurels and Awards

MPCL participated in the **11th National Forum for Environment & Health (NFEH) CSR Awards 2019**, held at Serena Hotel Islamabad on 24 January 2019. The event was graced by the President of Pakistan, Dr. Arif Alvi as the Chief Guest and President AJK Sardar Masood Khan, as the Guest of Honour, who also distributed the Awards. MPCL won three prestigious Awards. **Best CSR & Sustainability Award 2017-18**. The Award was received by Brigadier Shaheryar Khan (R), SI (M) – General Manager (Administration & Security). Sports initiatives recently undertaken by MPCL have been recognized at the Awards. **Sports & Recreational Activities Award** was received by Brigadier Saleem Nawaz (R) – Senior Consultant (Sports). The only other company to receive this Award was National Bank of Pakistan. MPCL secured **Advanced Level** in the ISO 26000 CSR Assessment in

2017. The only Company to have achieved this milestone. Thus, the **Best CSR Practices** Award was conferred to MPCL for this feat, which was received by Mr. Usman Aslam – Senior Sustainability & CSR Specialist. It is worth noting that MPCL was the only organization to secure these many awards at the Event. MPCL being the major sponsor of the event received the **Sponsorship Shield**, which was presented by the President of Pakistan to Mr. Assad Rabbani – General Manager Corporate Affairs. The Awards received, demonstrate Mari's resolve and commitment in improving the lives of marginalized communities.

At the "14th EFP Best Practices Awards on Occupational Safety and Heath" ceremony, organized by the Employers' Federation of Pakistan on April 26, 2019 at Marriot Hotel Karachi. Mr. Shafqat Mehmood, Federal Minster for Education and Professional Training was the Chief Guest at the Event which was attended by a large number of dignitaries from the corporate world. Mari has won several sector specific awards in the past for its HSE practices. However, this year, Mari has bagged **Overall Platinum Award** which is the highest award in overall category. MPCL was declared winner on the basis of a transparent evaluation of nomination papers submitted by all the participating companies. The evaluation was carried out by an independent jury.

Mari won two prestigious awards, **"Prime Minister's Award for Corporate Excellence"** and **"Fastest Growing Company of the Year Award"** at 32nd Rawalpindi Chamber of Commerce and Industry (RCCI) International Achievement Awards 2019. The awards were conferred by **His Excellency Dr. Mahathir bin Mohamad, Prime Minister of Malaysia**, at an impressive ceremony held on July 09, 2019, in Kuala Lumpur, Malaysia. MPCL was the only Company to have received **"Prime Minister's Award for Corporate Excellence"** which was the highest category award.

In May 2019 , this all transformed into a fact when MPCL for the first time in its history was included in top 25 companies on Pakistan Stock Exchange, it was placed at No.16 Position for the year 2017.[6]

BUSINESS RECORDER ISLAMABAD FRIDAY 30 NOVEMBER 2018

MPCL wins first prize for best employment practices, CEO of Year award

6 https://mpcl.com.pk/2019/05/23/top-25-companies-on-pakistan-stock-exchange-for-the-year-2017/

Chapter V

Fields, Wells and Rigs of Mari

In its strictest sense, petroleum only includes crude oil, but in common usage it includes all liquid, gaseous, and solid (e.g., paraffin) hydrocarbons. Under standard pressure and temperature, lighter hydrocarbons such as methane, ethane, propane and butane occur as gases, while pentane and heavier hydrocarbons are found in the form of liquids or solids. Although there are some important Precambrian and Palaeozoic rocks in Pakistan, the bulk of the country is dominated by the effects of the India-Asia collision. A collision mountain belt comprising the Himalaya, Karakoram and Hindukush Ranges forms its northern part.

Pakistan is endowed with three major Sedimentary Basins which covers 827,000 square kilometres[1], namely the Indus Basin in the east extending into India, the Balochistan Basin on the west extending into Afghanistan & Iran and the Pishin Basin in the north-west which extends into Afghanistan. At the time of independence only 28% of this area was known geologically.[2] The geological setting of Pakistan, in the framework of the modern concept of Plate Tectonics, is rare and matchless in the world. It is in the sense that within an area of about 800000 square kilometres critical tectonic junctions of different interacting plates and micro-plates arc present in a unique environment, where field exposures are excellent and the accessibility is easy.[3]

Balochistan – Parched Civilisation

Balochistan is the most ancient of all civilisation known to mankind, a civilisation which died because of the scarcity of water. The thousand years old trees in Ziarat, the dried bowls of once alive lakes, the mountains that have outlived their life and now approaching a dusty grave are all evidence that once this land was full of life. Baluchistan's history is linked with Persia and Aryans. Balochistan first emerged in history with the expedition of Semiramis, Queen of Mesopotamia in 900 B.C., she is reported to have invaded India and retreated through the coastline, being able to survive with twenty odd followers. The first detailed description about ancient Balochistan surfaces through the campaigns of Alexander the Great, who in his retreat also adopted the coastal route. His land journey in 325 B.C. took him from the present day Karachi, Bela, Kalat, Makran (Gedrosia) and Gwadar area. The Greeks were constantly harassed by the hostile population, and the scarcity of drinking water was so acute that Alexander's troops again mutinied; now for drops of water. In 1838, the British East India Company decided to put a ruler of their favour in Kabul, geography and politics compelled them to follow the Sukkur-Sibi-Bolan-Quetta-Kandahar route. This is the first modern account of present day Balochistan. On the eve of Second Afghan War, a treaty was reached between the British and Khan

1 Ministry of Petroleum and Natural Resources *Opportunities in Pakistan's upstream Oil and Gas sector*
2 Geological Bulletin Punjab University, No.18, 1983
3 Government of Pakistan Ministry of Petroleum and Natural Resources *Stratigraphy of Pakistan* (Geological Survey of Pakistan, Islamabad, 2009). PP-2-30

of Kalat at Mastung in 1876.[4] The Baloch Sardars and Khan of Kalat agreed to accept the mediation of British government in their common disputes rather than the Afghan government. Balochistan thus became the very first political agency in the western frontier to be raised and established by the British, Robert Sandeman became the first agent to governor general (AGG). Khan of Kalat had leased certain territories to British and they formed the agency. Sandeman established his headquarters at Quetta, a distance of 100 miles west of Kalat.[5] British India had entered in a treaty with Iran over the borders in 1871, 1896 and 1905.[6] The initial settlement of frontier of Balochistan with Persia took place in 1871, Major General Fredrick Goldsmid was the main negotiator from the British India ~~side~~, and the line (border) thus is named after him. On independence in 1947, Pakistan inherited almost 590 miles of border (Goldsmid Line) with Iran.[7] An another line, Durand Line was drawn in 1894-95 between Afghanistan and India that demarcated the western frontier of Balochistan with Afghanistan; under the Durand-Rahman Treaty , Afghan ruler ceded certain areas to Balochistan including Pishin.

Balochistan is Pakistan's largest province and geologically it's the oldest, tracing its origin to the ice age. Baloch literary means wanderer. Balochistan covers an area of 347,188 square kilometres (larger than England) with a population of 4.3 million (5.14% of Pakistan's total population). The average population density of 12 persons per kilometre is one of the lowest in the world. The province is mainly barren, rugged, desert, and mountainous. The Annual rainfall is to 2-4 inches and the

4 Issac Bruce ,., *The Forward Policy and its results or thirty Five Years work amongst the tribes on our North Western Frontier of India, first edition 1900.*Quetta: Gosha –e-Adab, 1977

5 Charles Dilke, *The Baluch and Afghan Frontiers of India, (Littels Living Age American Periodical), May 4th 1889, p- 287.*

6 Mujtaba ,Razvi, *The Frontiers of Pakistan, a Study of Frontiers Problem in Pakistan Foreign Policy* (Karachi: National Publishing House, 1971)pp,144-145.

7 *Ibid,p 206*

MARI PETROLEUM COMPANY LIMITED
MPCL

Zarghun at Night

temperature soars to 55 degree Celsius in summer and down to below zero in winter. In the north, it is bounded by Khyber Pakhtun Khawa (KPK) Province, on the west is Afghanistan and Iran, in the south a coastline of over 470 miles with Arabian Sea and towards east are Sind and Punjab. Balochistan is like a big bowl protected by mountain ranges all around varying from 2000 meters to 4000 meters and only through passes caravans can enter. Province can be divided into three distinct linguistic groups namely Pakhtuns in the North and along Durand Line having a population of 0.8 million with their chief tribes settled in Zhob and Chaman. Brahuis are about 0.9 million and occupy coastline and central area including Kalat, Kharan, Makran and Bela they speak Brahui. The third are the Baloch tribes from which the province derives its name, they are settled along the western mountain ranges of Indus Valley. They claim their descent from Aleppo of Syria[8] and have a population of 0.7 million. The chief tribes are Bugtis and Marris. Some of the Baloch tribes are also settled in Iranian province of Siestan. The Baloch are tall, strong, having long well oiled hair and curly beards. They traditionally and compelled by the extreme hot weather are dressed in long white flowing cotton robes and are excellent riders. For over two centuries they resisted the British and retained their independent way of life. In the absence of agricultural land they live a nomadic life. Tribes of Baluchistan adhere to the tribal bond of honour which is rooted in Hammurabi's Laws. It is a historical coincidence that largest gas reserves in Pakistan were discovered in Baloch tribes territories.

The term Baloch is a derivate of Belus, the title of Babylonian, followers of Nimrod used to be called ~~as~~ Belusis and in Arab literature they were known as Balos. All this along with the fact that ruins of Mehrgarh in Balochistan further augment the hypothesis that Balochistan, was the cradle of civilization which later perished due to the scarcity of water.[9]

Geology of Balochistan

Geologically, Balochistan is part of Triassic to recent strata with different tectonometallic and sedimentary basins like Baluchistan Basin, Indus Suture, Suleiman and Kirthar Basins.[10] Balochistan is the richest province among all others in terms of minerals, with large proven reserves of gold, indigenous iron, copper, lead, zinc, barite, chromite, coal, gypsum, marble, ochre, silica sand. Almost 58% of Pakistan's coal production comes from this province apart from huge deposits of gypsum in the Suleiman fold belt. On the coast, Makran Mud volcanoes are quite common, they are also found in Pishin –Zhob basin. Petroleum seeps were first reported at Moghul Kot, Khattan, Gokurt and Sanni alongwith bituminious staining in the Sanjwani and Duki.

Balochistan Basin covers an area of 250000 square kilometres and is roughly delineated between Axial Belt of Pakistan to the east and the Lut Block of Iran in the west. The Balochistan Basin is bounded by Afghanistan in the north and Arabian Sea to the south. the evolution of Balochistan Basin is obscure prior to Jurassic.

8 Gulshan Majeed *National Integration in Pakistan, a Socio-Political analysis of Balochistan* . Ph.D Thesis Punjab University, September 2011. P-58

9 Ibid.

10 Muhammad Sadiq Malikani, *Stratigraphy, Mineral Potential, Geological history and paleobiography of Balochistan province, Pakistan*. Sindh University Research Journal (Science Series) volume .43(2)269-290(2011)

From Right, Lt Gen Imtiaz Shaheen (R) President General Musharraf, Lt Gen Hamid Rab Nawaz with Zarghun Model

Mari's Zarghun

Zarghun Gas Field is located 50 kilometres north east of Quetta city. The field is spread over Harnai and Sibi Tehsils; area is the seam of Baluchi and Pashtun tribes. [11] Zarghun itself forms part of Bolan Block. Discovery of hydrocarbons was first made by a British-Kuwait consortium (Premier Kufpec) in 1998. Drilling at the first exploratory well Zarghun South-1, commenced on 4 June 1998. The well reached its target depth of 2094 meters on 8 August 1998. The testing revealed gas in Dunghan /Mughal Kot and Chiltan reservoirs; gas flowed at a maximum rate of 16.7 MMSCF per day. The second well Zarghun South-2 was drilled successfully in 2000.

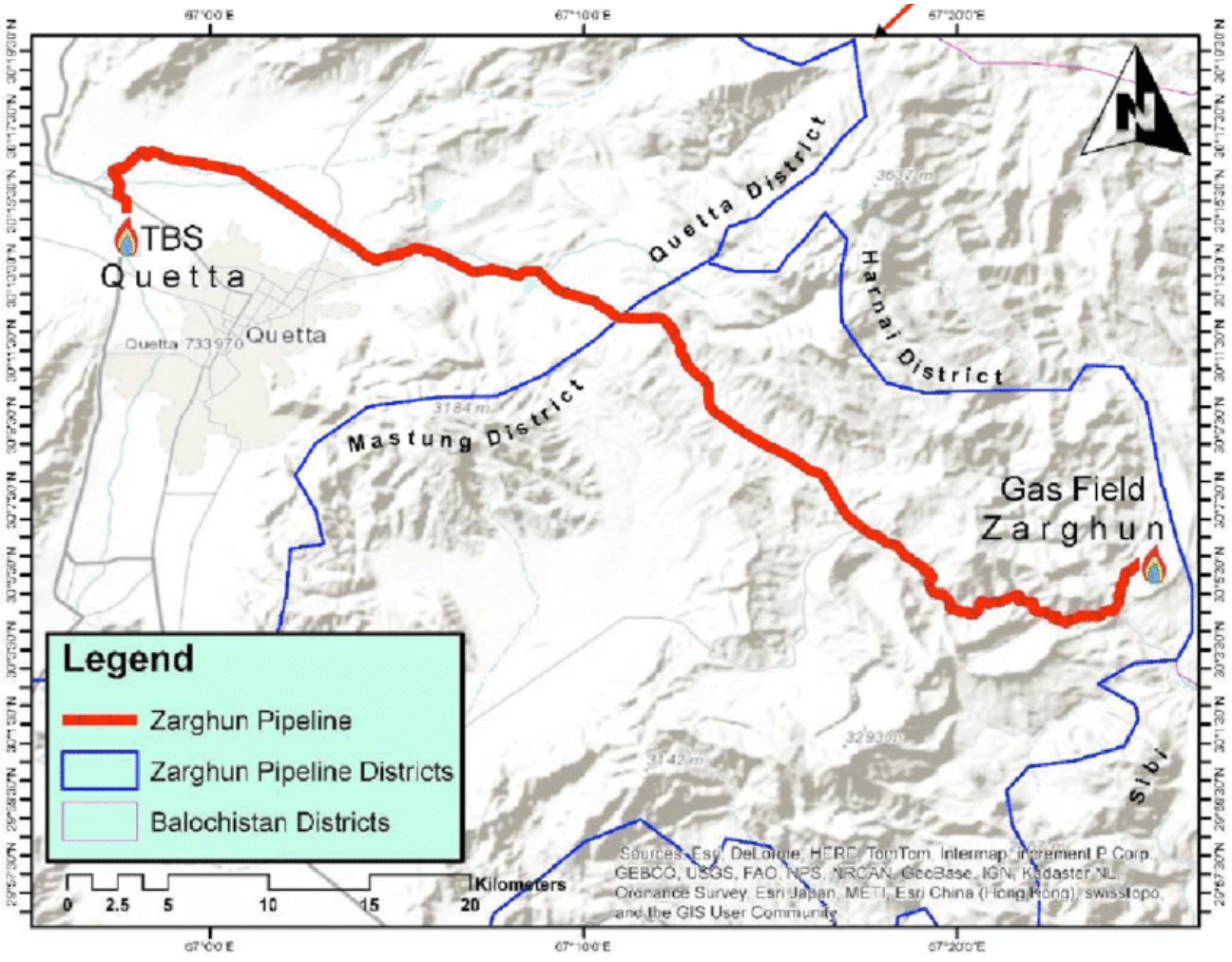
In 2003, Mari acquired the operatorship of the block through formation of a Bolan Block Joint Venture. The prospects were challenging as it required installations of a processing plant and transportation of gas itself to the tie-in point; involving a distance of 64 Kilometres through rugged, harsh, high mountains. In August 2006, an agreement was signed between Mari and SSGL under which the latter agreed to purchase ~~the~~ gas from Zarghun and it was also agreed upon-to share the cost of pipe laying.[12] President General Pervez Musharraf inaugurated the commencement of development of Zarghun Gas Field on December 8, 2006.

11 Mari Annual Report 2014.
12 https://www.dawn.com/news/207891

All these plans were put into hold due to miscreants activities in the region and area. In 2009, the cost of the field development project had risen to 40 Million US$, resultantly the entire project looked uneconomical.

It was a blessing in disguise as instead of giving up the entire project, Mari in order to overcome the Gordon Knot undertook development of the field through its own in-house resources. Engineering, procurement, site supervision were thus performed by Mari itself. '**MPCL took this as a challenge, by relaunching the project'**. [13]

Coincidentally the Tight Gas Policy was also announced in 2012 and Zarghun Gas Field qualified for a higher price, thus all of a sudden the economics of the Dunghan reservoir improved dramatically. In 2013, Mari relaunched the project, security was the primary concern and the whole success of the operation relied upon it. Brigadier (retired) Salimullah the resident director of Mari at Quetta played an important role in co-ordinating various strands of security. Frontier Corps Baluchistan deserves special gratitude in this regards along with the 'Gallant' Army Aviation squadron at Khalid Air Base.



13 Ibid.

Camp establishment and mobilisation of personnel was completed in October 2013 and by the end of February 2014 the civil works were completed, it goes to the credit of entire team that they finished ~~it~~ in time despite ~~a~~ harsh cold weather. Winter is harsh in the area, cold winds blows through the blood veins, heavy snow often cuts off the camp , in such an environment, mechanical construction of pipes; construction works for civil, mechanical and electrical activities were undertaken by Mari. 'varying obstacles were encountered during this stage, attacks from miscreants, adverse weather, delay in shipments.'

26 August 2014, is a historical day in Mari's history when supply of gas from Zarghun to Quetta City was made possible, by supplying gas to ~~the~~ SSGC . For the record it is worth mentioning that the entire project was completed by Mari at an astonishingly low cost of US$23 Million in 2014 as compared to the contractor who had quoted US40 Million in 2009. In September 2016, Zarghun South (ZS) a development well was spud in. ZS-3 is the first ever highly slant well drilled by Mari using its own Rig and expertise. The well reached total depth of 1820 meters on November 20, 2016. [14] The Zarghun Gas Field project is unique in the Pakistan petroleum history, as this is the only gas discovered which is supplied to area locals exclusively. Zarghun is estimated to have gas reserves of 93 BCF. The laying of the pipeline from Zarghun to Quetta City by itself is a great achievement of Mari's human endurance and engineering marvel.

Hanna and Harnai

The **Hanna Block**, consisting of an area of 886.65 square kilometres is located in Balochistan province and lies in prospectivity Zone 1. (Pishin, Ziarat, Loralai, Quetta, Sibi and Kalat Districts).[15] Mari is committed to a minimum financial commitment of US $1.30 million with one optional well up to a depth of 1000 meters or 100 meters into Dungan Formation, whichever is shallower. The **Harnai Block** consists of an area of 2482.67 square kilometres and lies in prospectivity Zone 1. Mari is committed to a firm programme of minimum financial commitment of US$ 6.175 million with a committed exploratory well upto depth of 1500 meters or 100 meters into Chiltan Formation whichever is shallower.

Ziarat Block- Bolan East-1 near Mach City in Kachhi District.

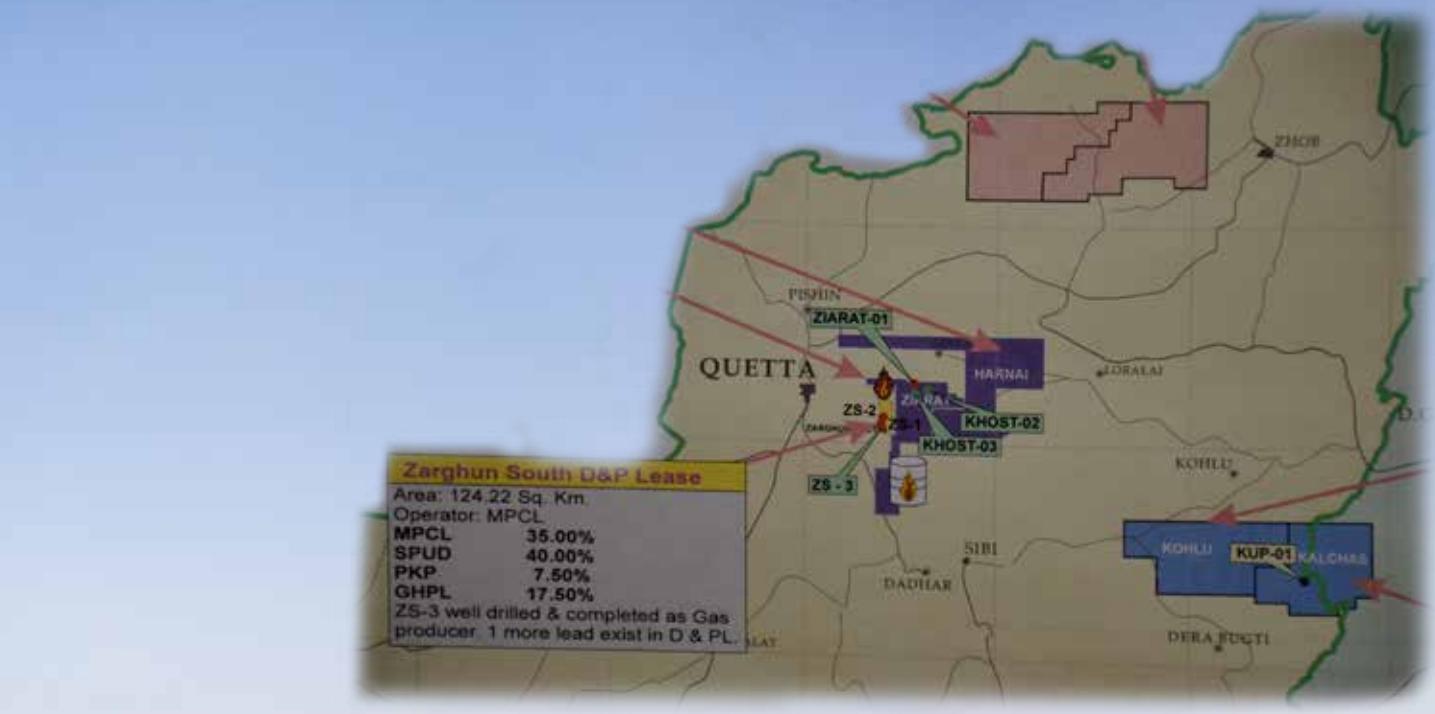
In 2005, Mari entered into its first ever operation outside Daharki with drilling of Ziarat Exploratory Well No.1 MPCL is the operator of Ziarat Exploration License with 60% working interest, while PPL (Europe) is the joint venture partner with 40% working interest. The well was planned into the Chiltan Formation of Jurassic age.

EWT operations started on May 25, 2009. After producing 2285 bbls of crude oil, the well was shut down on June 15, 2009 due to pressure build-up. The work-over operation was conducted with

14 ttps://mpcl.com.pk/2016/12/29/commencement-of-production-from-development-well-zs-3-in-Zarghun-south-gas-field-bolan- block/. https://fp.brecorder.com/2006/12/20061208505585/

15 https://www.thenews.com.pk/archive/print/11875-mari-gas-wins-three-exploration-licences

Zarghun


ZHOB
PISHIN
ZIARAT-01
QUETTA
HARNAI
LORALAI
ZS-2
ZS-1
KHOST-02
KHOST-03
ZS - 3
KOHLU
SIBI
DADHAR
KUP-01
KALCHAS
DERA BUGTI
Zarghun South D&P Lease
Area: 124.22 Sq. Km
Operator: MPCL
MPCL 35.00%
SPUD 40.00%
PKP 7.50%
GHPL 17.50%
ZS-3 well drilled & completed as Gas producer. 1 more lead exist in D & PL.

MPCL

Zarghun Gas Field

50 kilometers North East of Quetta

MARI PETROLEUM COMPANY LIMITED
MPCL

MPCL's own Rig Mari-1 and crew. The rig was mobilized on November 15, 2012. After the successful function testing of the Jet Pump, the Rig was released on January 02, 2013. With coordination and team effort, permanent surface production facilities were installed at the location. EWT operations at **Khost-3** commenced on March 15, 2013. **On 22 May 2018**, Mari and its joint partner made a significant discovery at Macch in Kachhi District (part of Ziarat Block). Well was drilled down to 1,500 meters 'The drill stem tests carried out in Chiltan Formation, which showed a flow of 810 barrels per day (bpd) another drill stem test in Moro/Mughal Kot Formation tested 690 barrels per day of oil'. [16] **It is highlighted that this is the first ever oil discovery in Chiltan and Moro/MughalKot Formations in Balochistan Province**. [17]

Lahore

16 The Tribune 15 September 2018. https://tribune.com.pk/story/1803665/2-balochistan-mari-petroleum-finds-significant-oil-deposits/

17 https://mpcl.com.pk/2018/09/27/hydrocarbon-discovery-exploratory-well-bolan-east-1-ziarat-block-balochistan/

Mari in Punjab

Punjab is Pakistan largest province in terms of population and second in terms of area; it is the cultural heart of not only Pakistan but also ~~that~~ of sub-continent. The province derives its name from the Persian; Panj (five) and Ab (water) meaning land of five rivers. Punjab covers an area of 205,344 square kilometres having a population of 110,012,442. At the beginning of empirical history, it was the cities of Taxila, Sialkot and Multan which marked the great seats of trade, government and learning. Lahore emerged at the dawn of last millennium and till to date retains its importance as a seat of culture and commerce; it is the capital of the province. [18]

Chillianwala site of one of the most decisive battle of 19th century. Between Sikhs and British

Harappa archaeological ruins date back to 4500 years and is one of the most important link in the evolution of civilization. It was regarded as the ~~very~~ first city state of Aryans. Buddhist ruins at Taxila not far from Mari's headquarters in Islamabad are regarded as the oldest seat of learning in our world's history; they date back to 500 B.C.[19] Tashkila was the most prosperous satrapy among the twenty odd satrapies paying tribute to Persia. Tashkila was paying in terms of gold whereas others were paying with silver and gold was fifteen times higher than silver; this highlights the prosperity of the city.[20]

In ancient Punjab, mode of transport for the nobility was horse, elephants were the mode of transport for the king and ~~the~~ rajas, footwear was made of white leather with heavy soles to increase the height of the person, white dress made of cotton ~~and~~ wrapped around the lower and upper part with a head gear was the standard dress code, due to the hot weather people used to spend part of the hot summer day under the shade of trees. Women and all the other population exhibited high integrity and virtue, locals have been depicted as healthy mainly due to their simple diet and abstinence from wine, doctors specialized in every part of the body and disease, the nuisance and hazard of snakes and scorpions was manifold as they were found under every stone and caused painful bleeding from pores and ultimately death. Yet local doctors with the help of the herbs were able to cure these life-threatening and painful bites, another method of relieving pain was through singing which was performed by natives. Men used to dye their beard in various colours like red, green, white and purple, men also used to wear jewellery, especially earing made of ivory.[21]

18 John Keay *India a History*, , (Grover Press, New York,2000,)
19 Cambridge *Encyclopaedia of South Asia* ,1982, pp,22-99. Jawaharlal Nehru *The Discovery of India* (John Day , New York,1945)
20 Herodotus *The History*, translated by George Rawlinson, ed Manuel Komroff,(Tudor,NewYork,1928)
21 Herodotus *Historia*

Alexander the Great's campaigns in Punjab are the earliest and most detailed military and cultural narrative not only of Punjab but also are a great military heritage. The Battle of Porus is a cultural heritage of Pakistan as the historians have nothing but praise for Porus '*a man of character, he was different from the Persian Darius who fled from the battlefield.. Porus's two sons died in the battle field…. he looked majestic after the defeat in his over seven feet tall frame'*[22]. Alexander's soldiers mutinied a few miles ahead of present day Lahore mainly due to high attrition and militant tribes. Alexander ~~later~~ during his retreat was wounded in the citadel of Multan.

Government College Lahore

Multan was the very first Muslim kingdom in the sub-continent in 712 A.D, it was overrun by Mahmud Ghaznvi at the turn of last millennium, and soon along with Lahore these two cities became the pivot and seat of Muslim governance. In the succeeding years, Slave Dynasty followed by Moghuls retained the importance of these two cities . Multan was important as it controlled the southern routes of trade; Bolan and Baluchistan. Lahore like Multan was the province of ruling dynasties. Mughals built the largest mosque in the world at Lahore apart from many other breath-taking monuments including Shalimar gardens.[23]

It was Maharaja Ranjit Singh who established the very first native empire in Punjab and brought all the cities and towns under Lahore.[24] Two bloody and decisive battles between Sikhs and British resulted in British annexation of Punjab in 1849. They also retained Lahore as provincial capital and soon established some of the best colleges in the sub-continent at Lahore, including the present day Punjab University, Montsorie College, Aitcheson College, Mayo College, to name few. Apart from educational institutions libraries, gardens, museums were also commissioned by the British. Not only British but Sikhs and Hindus also contributed in building colleges and hospitals; Dayal Singh College and Sir Ganga Ram Hospitals are living examples.

Punjab was also the seat of political movement for independence; the Pakistan Resolution was passed in 1940 at Lahore. Punjab suffered the most during the partition of Subcontinent, when Punjab itself was divided on communal lines. In post-independence, army headquarters were established at

22 Arrian *The Campaigns of Alexander translated by Aubrey de Selincourt* (Penguin,1971),pp,200-280.
23 Imperial Gazetteer of India, 1904.pp10-30.
24 Cunigham Joseph Davey *History of the Sikhs*, (London: Oxford, 1918).

Rawalpindi, the biggest tank battle after WWII was fought in Chawinda near Sailkot in 1965.

Punjab culturally is an agrarian society; however, it is also the home of mega industrial areas including Faisalabad and Sialkot. The football used in 2018 World Cup was made in Sialkot so was the ball used in 1978 Football World Cup. Punjabi society is based more on caste than tribe, a person is known by the trade he is involved, Intermarriages among castes are a rarity. Punjab also has the largest Christian population in Pakistan. In every Punjabi village, one is bound to see a shrine of some holy person, almost every major city and town has a saint patron, Data Gunj of Lahore, Baba Farid of Pakpattan, Bahauddin Zikriya of Multan, and Imam Barri of Islamabad are some of the most famous saints in the Punjab. It is worth highlighting, that Punjab is also the home of Sikh religion, and as such some of the most holiest places in Sikh religion are also in Punjab, including Panja Sahib at Hasan Abdal, Dera Baba Guru Nanak, Kartarpur in Sialkot and Samadhi of Ranjeet Singh at Lahore. Punjab is also termed as the granary of Pakistan and off sub-continent. Wheat, rice and cotton are main cash crops. The agricultural revolution was brought in late sixties when the Engro Fertlizer plant was commissioned in Ghotki Sindh. The fertilizer increased the average output yield of an acre from 15 maunds to present over forty maunds per acre. The Punjabi culture is thus a fusion of; old and new, rich and poor, liberal as well as orthodox. It is lively as music is an integral part of it. Within Punjabi culture women works in fields, are educated and plays a key role in any fight that erupts in village.

In terms of sedimentary basins, the Punjab Platform is separated from Upper Indus Basin by Sargodha High to the north and Mari Kandhkot High to the south and Sulaiman Fore deep to the west. Proven and potentially viable plays range in age from Infra-Cambrian to Eocene.[25]

Ghauri Block

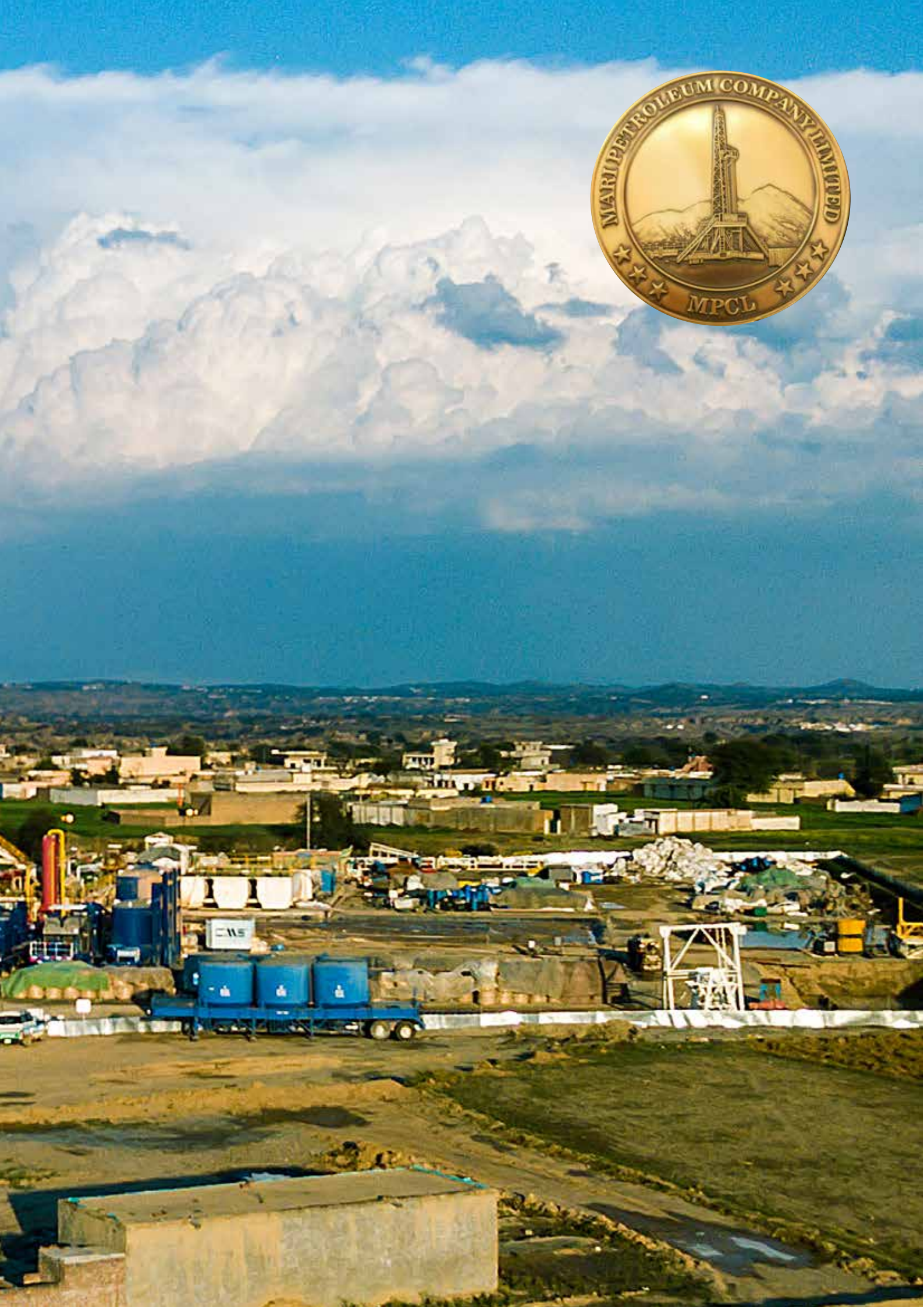
Ghauri Block was granted to Mari on February 16, 2010, covering an area of 1291.52 square kilometres, falling in Jhelum and Rawalpindi districts of the Punjab Province. The block was considered risky at that time due to presence of seven unsuccessful wells within the block; failure of these wells was presumed due to non-existence of mature source rock in the area. MPCL accepted the challenge and decided to take aggressive exploration activities in the area.

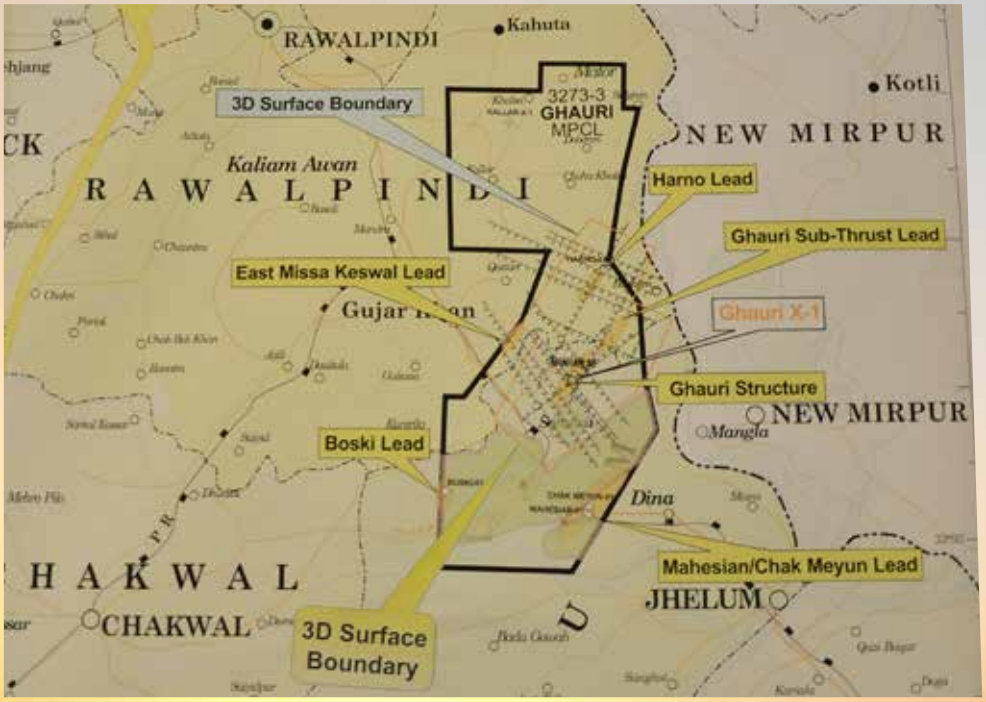
Based on in-house interpretation of 2D seismic data, first exploratory well Ghauri X-1 was spud-in on November 04, 2013 and target depth of 3,990 meters was achieved on March 01, 2014. The drilling and associated operations were completed in a record time of 117 days as against 235 planned days usually required for drilling a deep well in Northern region. MPCL made multiple finds at Exploration Well Ghauri X-1 while undertaking Drill Stem Test in Kussak Sand Stone and Sakesar Limestone. The well was successfully completed in Sakesar Limestone formation.

Production from well Ghauri X-1 was initially through natural flow, however a consistent and rapid decline in production was observed. Artificial lift system was installed at Ghauri X-1 in the form of Jet Pump targeting maximum recovery of in-place crude oil from Sakesar formation. Well was soon on

25 Ministry of Petroleum and Natural Resources *Opportunities in Pakistan's upstream Oil and Gas sector*

Ghauri


MARI PETROLEUM COMPANY LIMITED
MPCL


RAWALPINDI
Kahuta
Kotli
3D Surface Boundary
3273-3
GHAURI
MPCL
NEW MIRPUR
Kaliam Awan
RAWALPINDI
Harno Lead
Ghauri Sub-Thrust Lead
East Missa Keswal Lead
Ghauri X-1
Ghauri Structure
NEW MIRPUR
Mangla
Boski Lead
Dina
Mahesian/Chak Meyun Lead
JHELUM
CHAKWAL
3D Surface Boundary

Tomb - Shahab Ud Din Ghauri

IN THE NAME OF ALLAH
THE MOST BENEFICENT THE MOST MERCIFUL

MUIZUDDIN MOHAMMAD BIN SAM OR SHAHAB UD DIN AS HE WAS CALLED IN HIS YOUTH LATER POPULARLY KNOWN AS SULTAN MOHAMMAD GHORI CAME ALL THE WAY FROM GHORE AFGHANISTAN CHALLENGED A CONFEDERATED ARMY OF 150 INDIAN RAJAS NOTABLY CHANDEY RAO GOVIND RAI AND MANY MORE RAJPUT RULERS THIS ARMY WAS LED BY PRITHVIRAJ CHAUHAN RAI PATHORAI THE RULER OF DELHI AND AJMER THE BATTLE WAS FOUGHT IN 588 A H 1192 A D ON THE THANESAR PLAINS NORTH OF DELHI NEAR PANIPAT THE BATTLE LASTED FROM DAWN UNTIL AFTERNOON AT WHICH POINT GHORI PUT ON HIS HELMET AND ARMOUR AND LED HIS 12 000 STRONG CAVALRY AGAINST THE 120 000 STRONG RAJPUT ARMY NOT ONLY WAS HE VICTORIOUS BUT ALL THE FAMOUS RAJAS WERE ALSO KILLED BY THIS VICTORY THE MUSLIMS BECAME THE MASTERS OF HINDUSTAN AND GHORIS GENERALS QUTBUDDIN AIBAK AND BAKHTYAR KHILJI CARRIED ON THE CONQUESTS TO QANAUJ BIHAR AND BENGAL

GHORI HIMSELF AND HIS 3 GUARDS WERE TREACHEROUSLY ASSASSINATED IN HIS CAMP TENT DURING THE ISHA PRAYERS ON 3 SHABAN 602 A H 15 MARCH 1206 A D AT VILLAGE DHAMIK OFF THE RAWALPINDI LAHORE G T ROAD

THIS IS THE PLACE OF SHAHEED SULTAN MOHAMMAD GHORI'S MARTYRDOM CONQUEROR OF HINDUSTAN AND FOUNDER OF THE MUSLIM EMPIRE IN DELHI

مقدور ہو تو خاک سے پوچھوں کہ اے لئیم
تو نے وہ گنج ہائے گرانمایہ کیا کیے
(غالب)

MAUSOLEUM BUILT BY
DR ABDUL QADEER KHAN HILAL IMTIAZ
1994-5

MARI PETROLEUM COMPANY LIMITED
MPCL

Ghauri

regular production utilizing the hydraulic lift technology.

In April 2019, Mari and its joint venture partner PPL were able to discover oil at Dharain *the well was drilled in December 2017 and reached the depth of 4,770 metres with the objective of testing the hydrocarbon potential of Sakessar and Khewra formations as primary targets. The drill stem tests carried out in Khewra formation showed a flow of 372 barrels per day of crude oil.*[26]

Mari in Khyber Pakhtun Khwa

Khyber Pakhtun khwa (KPK) province, a decade ago was known as North Western Frontier Province, a name given when it was separated from Punjab in 1901-02. Khyber Pakhtunkhwa (KPK) is also known as *Ghandhara Civilisation.* The province at present covers an area of over 101.741 square kilometres with a population of over 35,525,047. It stretches from Chitral in the north and follows the watershed of Hindu Kush down to the Waziristan in the south, with Afghanistan on its west, Balochistan in south and Punjab in east.[27] In May 2018, seven tribal areas which were previously under the federal government control have been made part of the province through 26th Amendment In the Constitution of Pakistan.[28]

Mahsud Tribe War Dance

26 https://tribune.com.pk/story/1954865/2-mari-petroleum-finds-oil-reserves-rawalpindi/

27 *Imperial Gazetteer of India Volume 1, Indian Empire Descriptive*. (Oxford: Clarendon,1907-1909) pp,360-370.

28 http://www.radio.gov.pk/16-05-2019/enhancement-of-seats-for-merged-tribal-districts-to-pave-way-toward-qadri http://www.na.gov.pk/uploads/documents/1527169356_307.pdf. Constitution of Islamic Republic of Pakistan .

Peshawar University

Ruin of Ghandhara Civilisation

Traditional oral history of the Pathan, traces their origin , to be one of the lost tribe of Moses for the reason that it gives them a lineage to ~~the~~ Abraham's religion rather than to be termed as anything else.[29] The Pathan tradition highlights that they are one of the early converts of Islam. Historically the early migrations from highlands took place along the water down streams, through the few passes including Khyber, Kurram and Tochi. The tribes either settled at the passes or moved further eastward and settled in the fertile valleys and adopting agriculture as the way of life.[30] Pashtun society is thus based upon tribe way of life, among a dozen tribes only a handful are still migratory in nature including Afridi, Mohmand, Wazir, Mahsud, these tribes have different summer and winter abodes. Other tribes like Khattak and Yousafzai have permanent settlements. Each tribe is divided into clans and sub clans.−

KPK was a great seat of learning for the Buddhist religion, it is also home of some of most fiercest battles against Alexander the Great in Swat area. In modern time, neither Mughals, nor Sikhs or British

29 Olaf Caroe, *Pathan 550 B.C.-1957 A.D.*(New York: McMillan1965),p-26

30 George Curzon , 'Frontiers' The Romanes Lectures , 1907 delivered on 2nd November 1907, *Oxford Lectures on History ,1904-1923, Ten Volumes in One* . Library Press,1924.

Christmas Tree at Halini

Halini X-1

SAFETY

Kalabagh-1A was spudded in on March 20, 2015 in Karak Block with Rig Mari-1

MARJI PETROLEUM COMPANY LIMITED
MPCL

had an easy control over the area. Forward Policy and Great Game made the passes strategically vital for the defence of sub-continent.[31] In our time, Russian invasion of Afghanistan was an extension of the same policy and KPK played a vital, pivotal and decisive role in the war against Russia.[32]

9/11, had a direct impact on KPK, as thousands of Taliban took refuge in the tribal areas, the military actions by the western countries in Afghanistan including indiscriminate aerial bombing further escalated the exodus and fermented a resistance movement against the occupational forces in Kabul. Pashtuns live on both sides of the Pakistan- Afghanistan border (Durand Line). KPK thus suffered the maximum in these two decades of war on terror, both in terms of human lives as well as financially. The Pakistan Army in a prolong campaign with surgical precision and patience cleared the tribal areas from terrorism in such a manner that it also won the heart and minds of the people. At present the province is now healing back into the normal way of life.

Peshawar is the provincial capital and main city, other major cities include Kohat, Nowshehra, Mardan , Bannu, and Chitral. Presently KPK is a blend of conservatism and modernity, some of the finest educational institutions in the country are in Peshawar most notable being the Edwardes College and Islamia College (Peshawar University) along with Khyber Medical College. The biggest arms bazaar in the world was also located close to Peshawar having no less than 14000 shops dealing in arms and ammunition; majority of the arms being handmade. Pathan culture contrary to common perception is liberal, girls are educated, women have an important role within the domestic politics, and it is highly courteous and full of manners; however the spontaneous and instant flaring up of tempers is also part of this culture.

Karak Block

The Karak Block was granted to Mari, as operator with 100 per cent interest owner, on April 14, 2005. Subsequently MOL of Hungary acquired 40 per cent interest share in the block from the MGCL The block is located at the boundaries of Khyber Pakhtunkhwa and Punjab provinces between the districts of Karak and Mianwali. Crude oil discovery in Karak Block was made in the later part of 2011. To further appraise the potential of block, 3D Seismic survey was executed in 2013. Based on the processing and interpretation of 3D data, the location of two exploratory wells Halini Deep-1 and Kalbagh-1 were stacked on the ground.

Halini Deep Well -1

On May 17, 2014. Halini Deep Well -1 was drilled down to a depth of 5,900 meters. After conducting seven Drill Stem Tests in different zones, hydrocarbon discovery was made in Shinawari/ Samanasuk and Hangu /Lumshiwal formations. Installations of surface facilities including laying of 2.8 kilometre crude transportation line from Halini Deep-1 to well Halini X-1 and **installation of**

31 Algernon Durand. *Making of a Frontier, five years' experience and adventure in Gilgit, Hunza, Nagar, Chitral and eastern Hindu Kush*. (London: John Murray,1899).

32 Mohammad Yousaf and Mark Adkin *The Battle for Afghanistan ,the Soviets versus the Mujahedeen during the 1980s* (Yorkshire: Pen and Sword, 2007).

G8
G8

The Halini well was spud on January 07, 2011. The well has been drilled up to a depth of 5,350 meters.

discrete separation battery and storage facilities; were completed in a record time of 22 days. Oil production commenced on May 12, 2016 and the well was put on natural production.

Kalabagh

Kalabagh-1A was spudded in on March 20, 2015 in Karak Block with Rig Mari-1 to test the hydrocarbons potential of Sakessar, Lockhart, Hangu and Lumshiwal formations down to the depth of +2,750 meters. Subsequently, Mari decided to deepen the well down to 3,003 meter to evaluate the hydrocarbons potential of Samanasuk and Datta Formations. During testing, the well flowed gas and condensate from Datta and Samanasuk formations, while the testing at Lockhart formation resulted in flow of crude oil. **The construction and installation work for production and processing facilities was completed in March 2017. First gas supply started on June 14,2017.** 5-6 MMSCFD gas from Kalabagh to SNGPL

The Last Frontier; North Waziristan

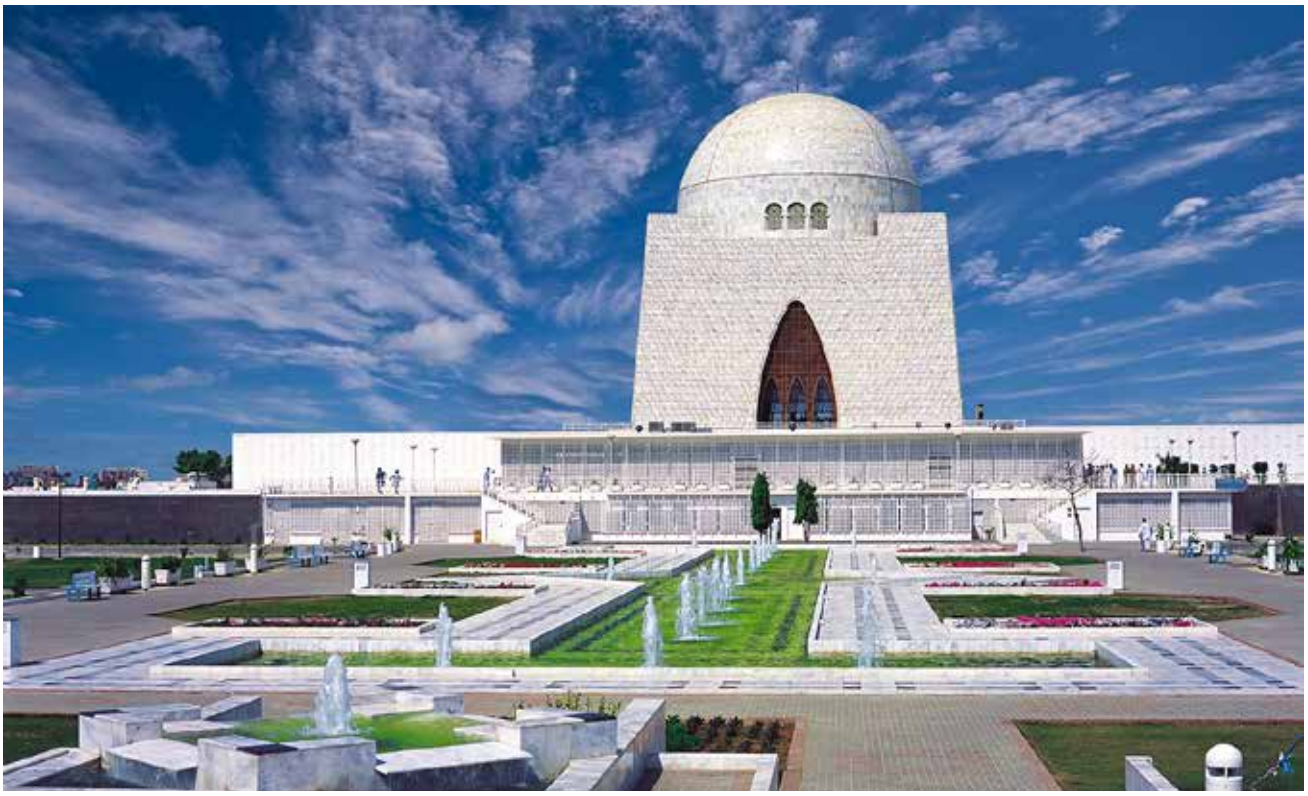
North Waziristan remained the most turbulent political agency for well over a century and only recently North Waziristan along with six other tribal areas has been brought under the administrative control of Khyber Pakhtunkhwa. Mari Petroleum Company, was awarded the exploration rights in this region in 2016, when the situation in North Waziristan or in Block Bannu West was precarious and uncertain. Mari as a company believes in accepting challenges, it is a culture and character which has been developed over the last two decades; encouraging bold steps in exploration.

The classic oil exploration is synonymous with frontier and hardship; the rewards are not only monetary but also shapes the destinies of people and generations. North Waziristan covers an area of 6000 square miles with a population of one million; till 1895 the entire area west and south of Bannu was known as Waziristan, British divided it into two political agencies namely North Waziristan and South Waziristan. Geographically the area comprises of mountains, dry river beds, countless water streams known as Tungi. North Waziristan is in fact also known as Tochi Valley, the tribes living within the valley are sub divided into clans and sub clans. From 2005, the security environment in North Waziristan became volatile to an extent that road travelling for non-residents was a matter of life and death, Pakistan Army and the Tochi Scouts were deployed to bring the situation under control and resultantly in 2014 a major operation was launched in the valley to flush out the miscreants; it was a successful operation. On the heel of this success, it was decided by the government of Pakistan to carry out further exploration in the area for oil and gas. Mari is firmly committed to the exploration in the North Waziristan as ‘ everything we do at Mari is governed by the national interest’ and Mari believes that this exploration is a milestone in not only discovering hydrocarbons in the area but also in paving the way for a cultural revolution in the area.

Sindh, Home of Mari

Sindh[33] is the home of Mari Petroleum Company, as the main reserves of the company are in this province. The history of Sindh is in fact the history of civilization in the Subcontinent, the ancient ruins at Mohenjo Dharo highlights the rich cultural heritage of Sindh. the province derives its name from the River Indus.[34] *4500 years ago human development reached a striking peak in the Indus Valley cities of Harappa and Mohenjo Dharo*.[35] The Indus valley is 950 miles long and 700 miles wide, its slope is steep 1:7,000 nearly double of the Egyptian civilization. Apart from Mohenjo Dharo there are several other ancient ruins at Kot Diji known as the Chando Darro[36], Alexander the Great during his retreat along the River Indus faced stiff

Seals excavated from Mohenjo Dharo



Mausoleum of Muhammad Ali Jinnah 'Quaid Azam' Father of the Nation

33 http://www.na.gov.pk/uploads/documents/1550130216_490.pdf. Under the 1973 Constitution the proper name is Sindh and not Sind, as it was used in past

34 Herodotus *The Historia*, translated by George Rawlinson, ed Manuel Komroff, (NewYork: Tudor, 1928), p.182.

35 Cambridge *Encyclopedia of South Asia* ,1982, p-9. John Keay *India a History*, (New York: Grover Press, ,2000) p.32.

36 Ibid p-452-458

Sukkur on the banks of River Indus

resistance in Sindh, he camped for several weeks at present day Thatta.[37]

Sindh was known as Hind by the Persians,[38] the province takes its name from the River Sindh, the province is also known as Mehran Valley. Sindh is geographically, culturally and ethnically divided into two halves, Upper Sindh which is home to the Sukkur, Khairpur, Larkana (Mohenjo Dharo) is agriculture based whereas the Lower Sindh including Hyderabad, Thatta and Karachi are commercial centres. Sindh is also known as gateway of Islam to sub-continent, as the very first Islamic invasion took place in this province.

British annexed Sindh in 1842,[39] it was a frustrating act on part of the British, after their humiliating defeat at Kabul. British East India Company had adopted the land route from Sukkur-Sibi-Bolan to enter into Baluchistan thus in order to safeguard the strategic route, ~~the~~ Sindh was made part of the Bombay Province and remained so till 1935 when it was accorded the position of a separate entity.[40] Under the British rule Sindh flourished and entered into modernity, very first police force in sub-continent was raised in 1866 in Sindh. Karachi emerged as the main sea port and later the very first aerodromes were constructed at Drigh Road, and Mauripur. It is worth highlighting that Colonel T.E. Lawrence

37 Arrian *The Campaigns of Alexander* translated by Aubrey de Selincourt (Penguin,1971),p-280
38 http://www.nihcr.edu.pk/
39 Imperial Gazetteer of India, 1904
40 Government of India Act 1935.

Shrine of Shah Abdul Latif Bhittai

'Lawrence of Arabia' served as an airman at Drigh Road base for well over three years. Karachi by 1920s emerged as main link in the trans-continental airways.[41] Sindh also has the distinction of being the very first province to vote for Pakistan in 1947, [42]after independence Karachi became the capital of Pakistan and remained so till 1960 when it was shifted to Islamabad. Karachi is the provincial capital and also the commercial capital of Pakistan, at present it boasts a population of over 20 million people having diversified ethnic background. Mari and its predecessor ESSO both had headquarters at Karachi. Exploration in Sindh started in 1893 at Sukkur.[43] Sindh culturally is Sufi oriented, ownership of land is mostly hereditary, the society is tribal in nature; overall a very serene and mild lifestyle. Apart from the overwhelmingly Muslim population the largest population of Hindus and Parsi in Pakistan reside in Sindh. It is worth highlighting that the very first women head of a modern Islamic state; late Benazir Bhutto hails from Larkana in Sindh.

Sindh is also the heart of Pakistan's fertilizer industry, two of Pakistan's biggest natural gas fields are in District Ghotki (Qadirpur and Mari). Pakistan's biggest fertilizer plant, Engro and another plant of equal magnitude Fauji Fertilizer are also operating in this district.

Sindh province has two major Oil and Gas bearing regions, Sindh Monocline commonly known

41 https://sindh.gov.pk/dpt/History%20of%20Sindh/history.htm

42 Fatima Riffat, Iqbal Chawla, Adnan Tariq *History of Sindh from a regional perspective, Sindh and Making of Pakistan* . (Lahore:Punjab University,2016),160.

43 https://www.dawn.com/news/1479814/a-brief-history-of-exploration

as Badin Block Area and Outside Sindh Monocline which includes Sukkur Rift Zone, Mazarani Fold Zone, Khirthar Depression and Karachi Depression. Districts including Badin, Tando Muhammed Khan, Hyderabad, Tando Allahyar and Thatta are also part of Badin Block Area.

Sujawal Block

The Sujawal Block consisting of 2,416.43 square kilometres is located in Sind province and lies in prospectivity Zone III. MPCL is committed to a firm work programme of minimum financial commitment of US $ 6.15 million with a committed exploratory well of approximately 3000 meters. The Sujawal Block was awarded to the company as operator with 100 per cent working interest in June 2006. **The company drilled its first exploration well, Sujawal X-1, in 2010, which led to a gas and condensate discovery**. The discovery has since been brought on stream supplying gas to the Sui Southern Gas Company and condensate to the Pakistan Refinery and Pak-Arab Refinery. Gas discovered is of a good heating value of 1045 BTU per cubic feet. The work on Sujjal-1 well, the second exploratory well in Sujawal Block, was taken up on 26 January 2014 and drilled down to a depth of 2535 meters in Lower Goru Formation. As a result of testing, the well flowed gas and condensate at a rate of 13.1 MMCFD (million cubic feet per day) and 75 barrels per day (BPD), 'We have been blessed with a significant gas and condensate discovery in Sujawal Block's Sujjal-1 well,'.[44] **This discovery is significant because it is the first hydrocarbon discovery in Lower Goru Upper C-Sand in the southernmost part of the country**

Aqeeq-1 exploratory well was spud-in on March 9, 2017 and drilled down to 2,320 metres to test hydrocarbon potential of the Upper Sands of Lower Goru Formation. During testing in Upper Sands, the well flowed 5 MMSCFD gas and 21 barrels per day condensate with wellhead flowing pressure of 586 Psi at 40/64 inch choke size.

44 *Dawn* 13th May 2014

Rigs of Mari

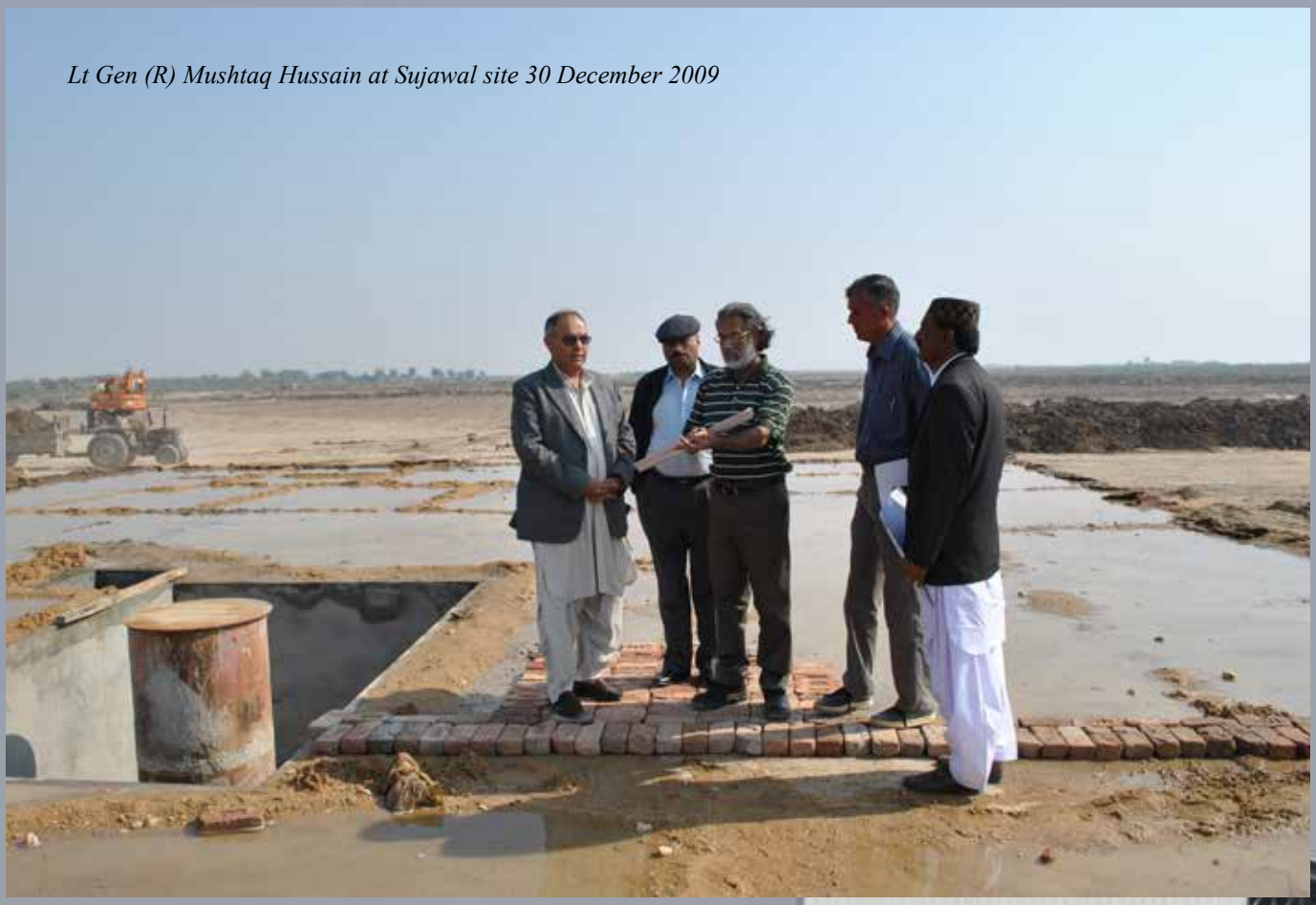
The drilling rigs are the working bulls of the E&P industry, the drilling rigs are the very essence and soul of oil exploration, ranging from towering massive structures to smaller ones; these structures drilled deep into the earth crust and recover valuable hydrocarbons. Mari inherited 'Sky Top Rig' from ESSO in 1984, the rig was bought in the late fifties.

Sujawal

Rig operators lead a rigorous life, working at the drilling site round the clock. Rigs move extensively and operate as a single unit and entity; where everyone precisely knows his task and duty. There is no proper institute for training Rig operators in Pakistan and majority of experienced operators working at Mari today have gotten their prior experience while working in the Gulf. With the induction of two new rigs, it was necessary for MPCL to have experienced and professional crews to operate these rigs.

At the drilling site, a well-established camp is setup in which the working, living and drilling areas are clearly marked and outlined. The supervision of the drilling rig is the responsibility of the Tool Pusher, an operator who wears a blue uniform, and ensures the safe and smooth conduct of the drilling rig. The Company Man wears a khaki uniform and is responsible for everything else apart from the work of the Tool Pusher. Apart from these two men, a representative of HSE is also present on site to ensure that all safety parameters and requirement are strictly adhered to. In order to deal with medical emergencies the presence of a doctor and ambulance is also available on site.

Contrary to popular perception, only a handful men are required to operate a rig, as they work in

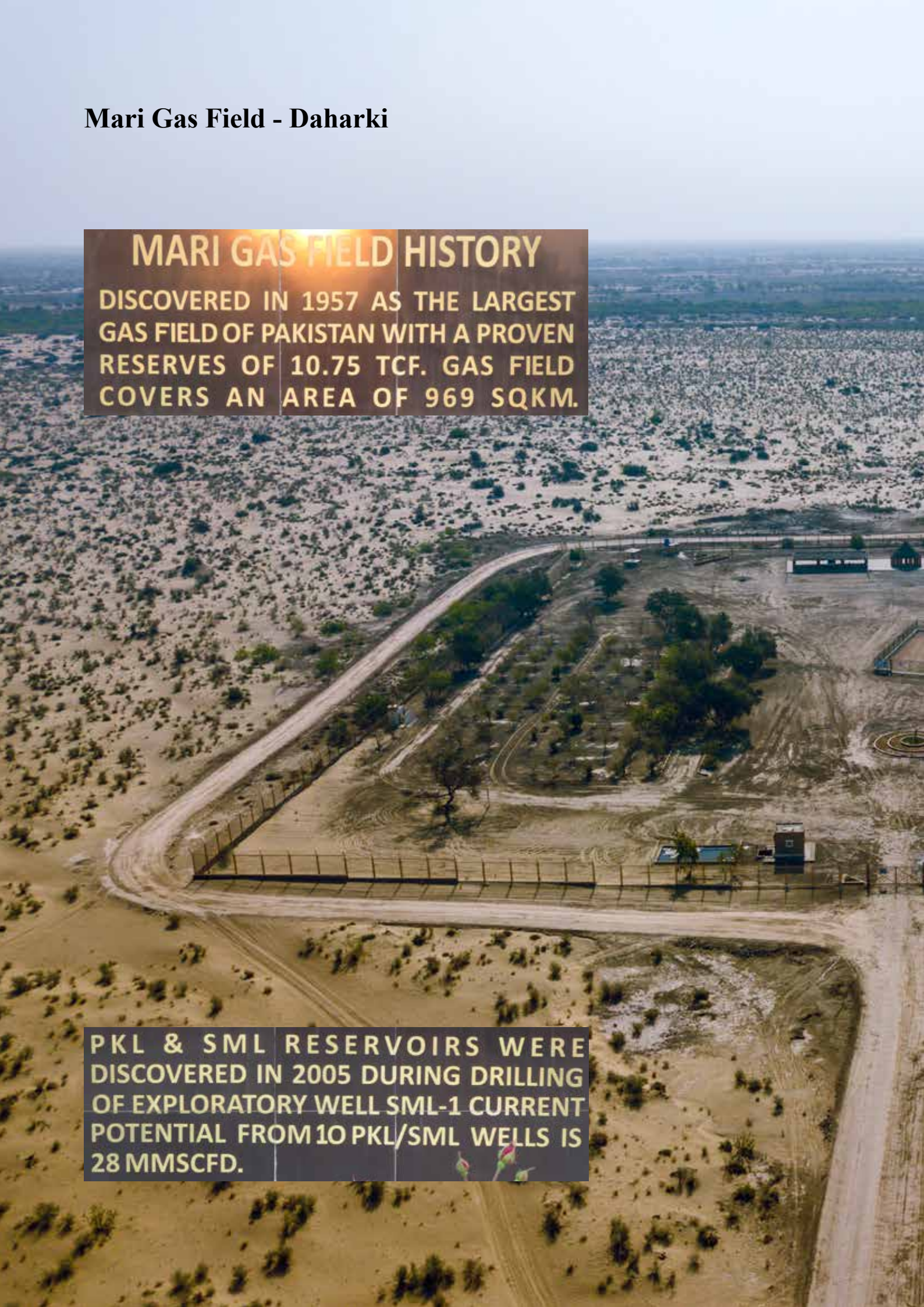


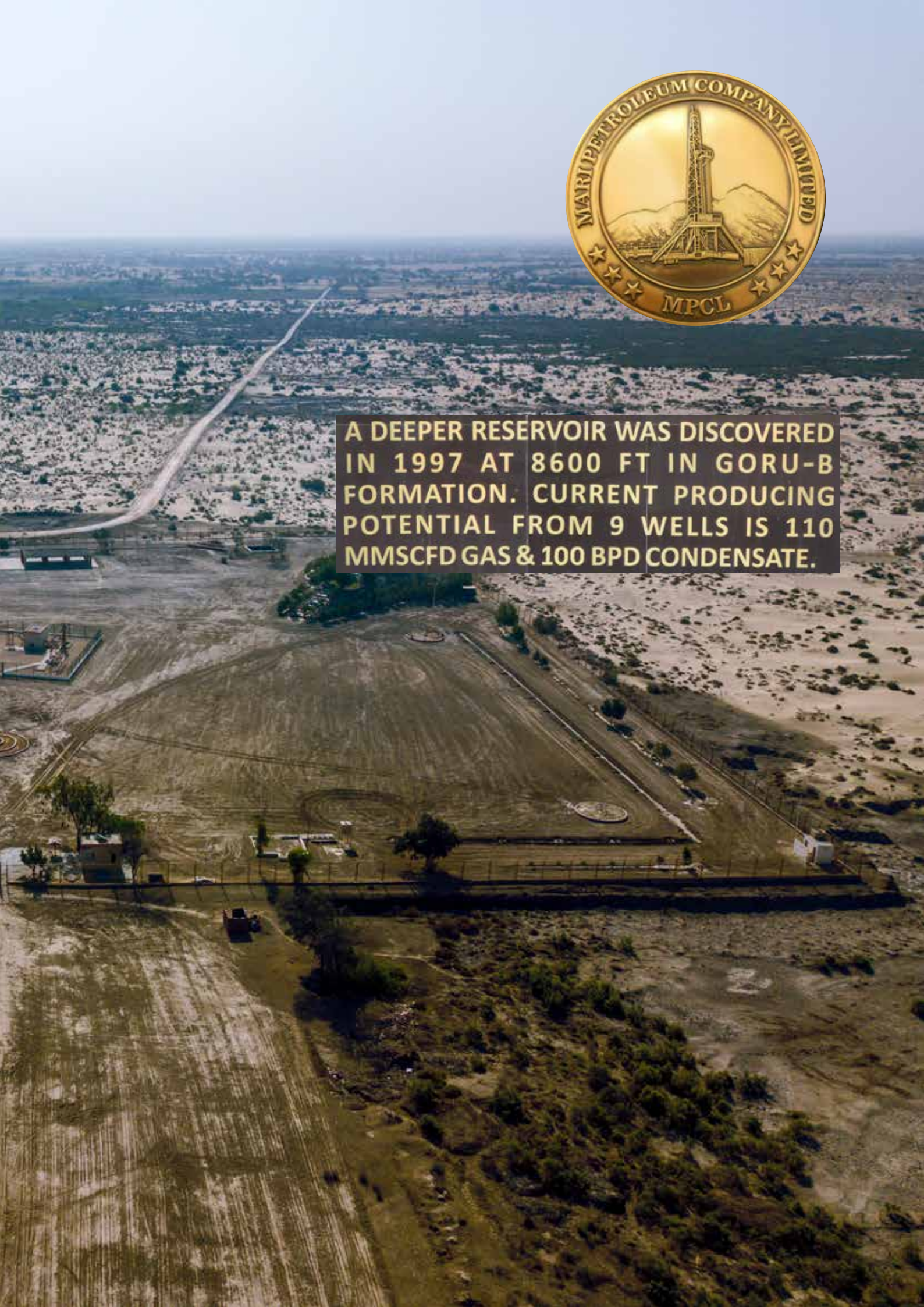
Lt Gen (R) Mushtaq Hussain at Sujawal site 30 December 2009

Lt Gen (R) Muhammad Raza with the Management and Staff on Sujawal inauguration, 07 March 2013

Lt Gen (R) Muhammad Raza at Sujawal inauguration, 07 March 2013

Mari Gas Field - Daharki


MARI GAS FIELD HISTORY
DISCOVERED IN 1957 AS THE LARGEST GAS FIELD OF PAKISTAN WITH A PROVEN RESERVES OF 10.75 TCF. GAS FIELD COVERS AN AREA OF 969 SQKM.
PKL & SML RESERVOIRS WERE DISCOVERED IN 2005 DURING DRILLING OF EXPLORATORY WELL SML-1 CURRENT POTENTIAL FROM 10 PKL/SML WELLS IS 28 MMSCFD.


MARI PETROLEUM COMPANY LIMITED
MPCL
A DEEPER RESERVOIR WAS DISCOVERED IN 1997 AT 8600 FT IN GORU-B FORMATION. CURRENT PRODUCING POTENTIAL FROM 9 WELLS IS 110 MMSCFD GAS & 100 BPD CONDENSATE.

NG SKIDS

MARI PETROLEUM COMPANY LIMITED

MDCPF

MDCPF TECHNICAL TEAM

NAME	DESIGNATION	FROM	TO
MR. GHULAM MURSHAD	CHIEF ENGINEER PRODUCTION	18-Mar-08	23-Jun-14
MR. RIAZ AHMED SHAH	DEPT. CHIEF ENGINEER PRODUCTION	3-Jul-14	30-Jan-15
MR. RIAZ AHMED SHAH	CHIEF ENGINEER PRODUCTION	1-Feb-15	1-May-16
MR. GHULAM MURSHAD	CHIEF ENGINEER PRODUCTION	2-May-16	23-Jul-17
MR. FARHAN BIN KHALID	PETROLEUM ENGINEER	18-Mar-08	16-Apr-14
MR. ZEESHAN AHMED	PETROLEUM ENGINEER	18-Mar-08	26-Feb-13
MR. AHSAN BASHIR	PETROLEUM ENGINEER	1-Nov-08	15-Jan-11
MR. SHABIR KHAN	TELEMETRY ENGINEER	2-Mar-09	3-Nov-17
MR. ADEEL KHALID	TELEMETRY ENGINEER	6-Apr-09	31-Dec-09
MR. FAHAD ASGHAR NIAZI	MECHANICAL ENGINEER	19-Apr-09	3-Jul-14
MR. ANJUM AZIZ	SENIOR PROCESS ENGINEER	15-Oct-09	15-Set-14
MR. UMAIR JAVED	SHIFT ENGINEER	3-Nov-09	18-Oct-10
MR. IKRAM-U-HAQ	SHIFT ENGINEER	15-Mar-10	9-Jun-17
MR. AFTAB AHMED WASAN	SHIFT ENGINEER	1-Apr-10	30-Nov-11
MR. SAQUIB ABBAS	SHIFT ENGINEER	27-Jun-11	–
MR. IFTIKHAR AHMED RAJA	SHIFT ENGINEER	2-Aug-11	3-Aug-16
MR. SAFIULLAH SHAIKH	PRODUCTION ENGINEER	30-Dec-13	–
MR. MUHAMMAD RASHID	PETROLEUM ENGINEER	3-Jul-14	1-May-16
MR. ALI MUSTAFA	PETROLEUM ENGINEER	7-Apr-14	8-Mar-18
MR. ANJUM AZIZ	SENIOR PROCESS ENGINEER	7-Apr-16	–
MR. IFTIKHAR AHMED RAJA	SENIOR SHIFT ENGINEER	4-Aug-16	8-Mar-17
MS. FAHA ZAHID	MAINTENANCE ENGINEER	10-Jan-17	–
MR. OMER AHSAN	PRODUCTION ENGINEER	21-May-17	–
MR. ALI USMAN	E & I ENGINEER	3-Nov-17	
MR. TUMBAIL MARRI	SHIFT ENGINEER	3-Nov-17	

MARI DEEP CENTRAL PROCESSING FACILITY (MDCPF)

Rigs of Mari

MPCL
RIG MARI-1
MARI PETROLEUM COMPANY LIMITED
MPCL

shifts approximately thirty odd men are sufficient for operating a rig around the clock. Work starts with the dismantling of the rig from one point and its transportation to another; Mari Rig 3, requires a truck load of approximately 90 units for transportation. This phase is accomplished with precision and requires experience.

The exploration and drilling of hydrocarbons involves studying the structure of the earth's crust. To spud a well requires months of meticulous hard work and planning. The present theories on hydrocarbons revolves around the hypothesis that, first and foremost a source rock has to be identified in which the fossils have been buried over the centuries and millenniums known as Palaeozoic Era; this source rock should be buried deep enough to allow the earth temperature and pressure to heat the fossils. Next to the source rock, porous rock formations having good permeability must be present so that it allows for a free flow of hydrocarbons; a Cap Rock is also essential as it seals or traps the hydrocarbons thus capping them inside the crust. In Mari, all this work is done by the Exploration Department.

The next step is to analyse the geologists' hypothesis by carrying out seismic survey, thereby probing deep into the suspected rock area. There are methods including Vibrosis, in which the vibrations are created and then their effects are analysed. Dynamite is another method in which the dynamite is use deep inside the crust to create ripples and then analyse it. Mari Services Department was raised in 2014 to carry out all such ventures at its own, thus bringing flexibility and economy to the company. In many of the annual board meetings it was highlighted that due to non-availability of such services the company has suffered losses, basing upon this, the MSD was raised. After the completion of this phase, the decision to conduct the physical drilling to validate the hypothesis is reached. Once, it has been decided drilling will be done, the intricate business of moving the rigs and other equipment is set into motion.

Acquisition of land is another delicate matter in which more than anything the social culture plays a key role. As long as Mari was operating in the Daharki, the acquisition was streamlined

due to the continuous presence and drilling activities of Mari Gas Company Limited and its predecessor ESSO. In the Mari Gas Field, initially an acquisition of eight acres was made for each well which has now been reduced to five acres. The owner is given a compensation for his land which is much higher than the market price and more importantly he is paid to protect the well as well. This system known as Chowkidar (watchman) is hereditary in nature, In Punjab, acquisition of land requires a more patient approach and the director lands (DM Lands) is required to undertake many sojourns and attends lengthy meetings not only with the owner but with his entire extended family at their residences. As soon as the general public realise that sooner or later an exploration will be conducted, they get into litigation amongst each other so that they can fetch the highest possible price for their land. Before any deal is reached the land records have to be verified and looked into. This process is long and tedious but is resolved in an amicable and peaceful manner.

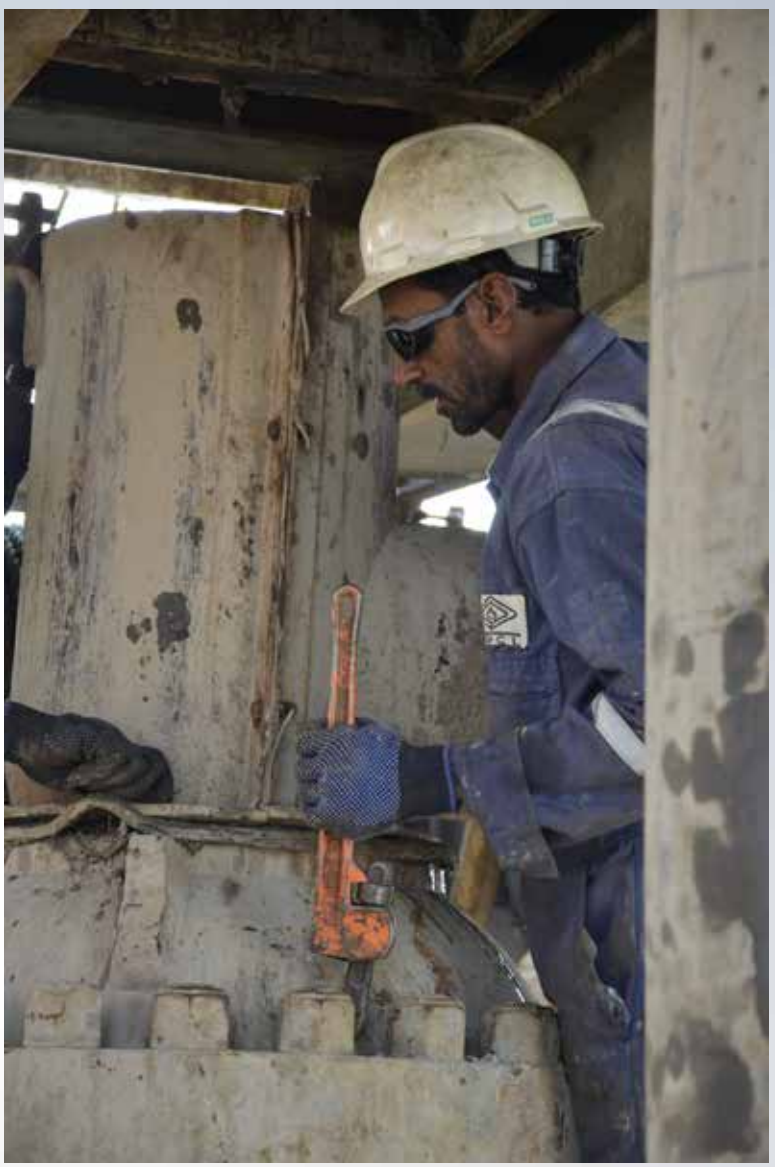
Establishing of the well and camp from scratch, requires clearing the area, it is cleared for establishing the basic essential amenities. One of the fundamental area that are taken into consideration involves safety as the first and paramount factor. The very nature of the well, whether it is wildcat, appraisal, exploratory or deep plays significant role in the overall development of the well.

Before the rig is moved, the administrative and safety parameters must be met. A camp with a rig is a high end camp, having its own doctor, ambulance, geologist, water supply, power, road, communication and now internet access. The living and catering is on contract. In the past it was in canvas, at present it is in air conditioned containers with attached washrooms. Two types of messes are established in the camp, one for seniors and another for juniors, there is no difference as far as the menu is concerned, it is only to allow

Rig Mari 1

Rig Mari 1 a 1500 horsepower rig was purchased from Messers Hanghua-China in 2007. In next seven years it drilled twelve wells. It was overhauled in September - December 2015 by Mari's own drilling unit; a great achievement. It is worth highlighting that initially it was proposed that rig should be overhauled from an international service provider, necessary paper work was carried out. An estimate of 1.7 US $ million with a time requirement of six month was quoted by the bidders. This is the first such instance of a rig being overhauled within Pakistan, it saved over one million US Dollars as well apart from three months of man hours.

Rig Mari 2



Rig Mari 3

Rig 3 a 2500 horsepower, was purchased in 2014 from China. It drilled the deepest well in Mari's history; Halini Deep-1 with a depth of 5,900 meters.

RIGMARI-3

greater freedom of relaxation to the juniors. Discipline in a camp is very rigorous and very rightly so as the job itself is highly inflammable and a minor lapse of concentration can have disastrous consequences results.

The drilling site is divided into two sections, one under the supervision of the Company Man and the other under the supervision of the Tool Pusher, with a representative of health-safety-environment (HSE). All the work especially the initial setting up and later day to day operations are monitored by HSE. Safety overlook isn't an integral part of our day to day life or culture in Pakistan, thus ensuring that everyone is wearing protective gear, identification of health hazards and ensuring that the highest safety standards are adhered is difficult and tedious task . At present, all fields are monitored in the head office through cameras for safety parameters.

Mari purchased its first Rig in 2007 when it signed a contract with Honghua Petroleum Equipment Company at their headquarters at Chengdu. It was delivered in Pakistan in March 2008. It is a 1500 horsepower rig which can drill down to 5000 meters. Another Rig Mari II was purchased and inducted in 2013, it was bought from same company but has more horsepower and can drill deeper than the two other rigs.